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REPORT OF STUDY GROUP TO DETERMINE NAVY REQUIREMENTS FOR ENGINE--ETC(U)  
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## REPORT OF STUDY GROUP

To Determine Navy Requirements For  
Engineering Duty Officers

and

the Actions to Satisfy  
Those Requirements



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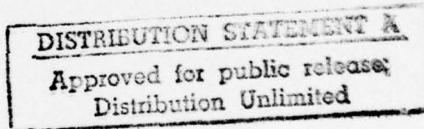


DEPARTMENT OF THE NAVY  
OFFICE OF THE CHIEF OF NAVAL OPERATIONS  
WASHINGTON, D.C. 20380

IN REPLY REFER TO  
Ser 04/710028  
27 August 1976

From: Engineering Duty Officer Study Group  
To: Chief of Naval Operations  
  
Subj: Staff Study of Engineering Duty Officer (1410)  
Community  
  
Ref: (a) CNO ltr ser 00/500856 of 12 July 1976  
  
Encl: (1) Report of Study Group to Determine Navy  
Requirements for Engineering Duty Officers  
and to Determine the Actions to Satisfy  
Those Requirements

1. The Study Group convened on 19 July 1976 as directed by reference (a) and continued its deliberations until this date.
2. The Study Group Report is submitted as enclosure (1) to this letter.
3. At 1630 this date the Study Group adjourned to await the orders of the Chief of Naval Operations.



C R Bryan  
C. R. BRYAN  
Vice Admiral, USN  
Study Director

H. C. Barnes  
W. C. BARNES  
Rear Admiral, USN

E. B. Fowler  
E. B. FOWLER, Jr.  
Rear Admiral, USN

D. P. Hall  
D. P. HALL  
Rear Admiral, USN

L. Baggett, Jr.  
L. BAGGETT, Jr.  
Rear Admiral, USN

J. D. Beecher  
J. D. BEECHER  
Captain, USN



P. M. Palermo  
MR. P. M. PALERMO

M. Hansen  
MR. M. C. HANSEN

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## EXECUTIVE SUMMARY

This study was ordered by the Chief of Naval Operations in a letter of 12 July 1976. In that letter, he cited a need to improve the Navy's capabilities in the design, acquisition and maintenance of ships and shipboard systems, noting that EDs have long been associated with these matters in both technical and managerial positions. He further noted that the range and complexity of these professional areas have increased, that some of the responsibilities and authorities have become fragmented, and that Ship Engineering and Ordnance Engineering have recently been merged into a single community. He concluded there was a need for "a comprehensive review of the fundamental requirements for 1410's and a clear determination of the role of those Engineering Duty Officers in the Navy."

The perception of the Chief of Naval Operations was shared by the naval officers and civilians consulted during the study. They were in general agreement that: (1) EDs are needed in the Navy as professional naval officers with superior technical competence and experience in ships and combat systems; (2) EDs have turned away from their role as technical experts and as a result, their capability and effectiveness have declined; (3) unrestricted line officers have also turned away from technical matters and their knowledge of the details of maintenance and operation of their ships has declined.

4 The following are among the Study Group's

The Study Group reached the following principal conclusions: (1) Engineering Duty

• The Navy needs an (ED) community of highly trained, experienced, professional naval engineers to technically direct the design, acquisition and maintenance of ships and combat systems; (2)

• There is need for an official document delineating the role and responsibilities of EDs: (1) as naval officers, (2) as a community of professional engineers specializing in ships and combat systems, and (3) as individuals accepting responsibility for technical matters in all assignments; (3) (cont. on p. 2)

(cont'd p 1)

• EDs should provide increased technical leadership and direction of design, acquisition and maintenance of ship combat systems. They should participate in Navy and DOD command and control, large area surveillance, and telecommunications systems, but the degree of this involvement could not be determined in the course of this study.

→ (4) → EDs need capability in financial management and contracting, but career specialization therein is not warranted.

→ (5) • There is a need for unrestricted line subspecialists in the design, acquisition and maintenance of ships and combat systems, and (6)

• The existing ED billet structure does not fit the EDs' role. With appropriate changes, such as reducing sea billets, the number of officers needed may be smaller.

• The ED community does not now have enough high quality officers to meet its responsibilities. Contributing factors are:

- Some EDs may not possess the capability and potential to achieve the requisite high standards of professionalism.
- Accessions are inadequate in quality and quantity.
- Formal training and qualification programs have only recently been initiated.
- Career planning has not provided proper specialization and tour lengths.
- Technical education has not been sufficiently emphasized.
- There is no overall Navy effort to motivate highly qualified officers to seek ED careers.

**Summary of recommendations:**

- Promulgate the role and responsibilities of the ED community.
- Revise the ED billet structure to conform to proposed criteria for ED billets, practical accession and promotion plans, and need for depth of experience for senior key positions.
- Establish professional and academic standards for accessions to the ED community.
- Intensify recruitment and accession of high quality officers to support the required ED community.
- Screen the current ED community to determine the ability and potential of the existing officers to perform to high standards of technical proficiency and professional responsibility.
- Assign EDs in accordance with a detailing plan designed to increase ED technical competence.
- Develop specific training and education criteria for selection of unrestricted line proven subspecialists in the technical fields.
- Encourage and assign high quality unrestricted line subspecialists to duty in technical positions in support of the design, acquisition and maintenance of ships and combat systems.
- Revise policy and curricula for ED postgraduate education.
- Assign explosive ordnance disposal officers a designator other than 1410.
- Determine the extent to which ED electronics specialists should be involved in Navy and DOD-wide command and control, large area surveillance and telecommunications.
- COMNAVSEA and COMNAVELEX develop the capability within their organizations to pursue implementation of this report and to effect long range planning for and continuing review of the ED community.

## SECTION I

### INTRODUCTION

#### A. Background

1. The Study Group convened on 19 July 1976 to accomplish the following:

a. Determine the Navy's requirements for engineering duty officers.

b. Determine the actions needed to satisfy those requirements.

2. Specific guidance given by the Chief of Naval Operations in the Study Directive, Appendix A, included:

a. Review all existing studies, analyses and other information relevant to the issues.

b. Structure of the community. Examine all present technical sub-elements as to their necessity to the mission.

c. Billets. Examine present billets for proper mix. Determine whether certain billets should be assigned to other communities or vice versa. Determine the proper number of ED billets for a well structured community.

d. Electronics Subspecialty. Examine role of ED in Navy and DOD-wide command/control, large area surveillance and telecommunications - only marginal involvement now.

e. Weapons Subspecialty. Examine role of ED in Navy shipboard weapons systems - only marginal involvement now.

f. Financial Management. Examine scope of ED participation in this area. Supply Corps has done much of this recently. Unrestricted line is being given an increasing role.

g. Contracting. Examine scope of ED participation in this area.

h. Relationship with Unrestricted Line. In all of the above, the unrestricted line role (subspecialists and WSAM designated) should be clearly identified vis-a-vis that of the ED.

i. Recruitment. Examine areas of recruitment of EDs. Determine the number of direct accessions from USNA, NROTC, and from civilian engineering schools via OCS. Determine number and entry point of line transferees into the ED community.

j. Qualification. Examine present programs for education and training of EDs. Consider whether additional shipbuilding experience should be provided to EDs as part of their qualification. Determine the amount of direct design experience required.

k. Career Development. Define ED career development, from cradle to grave, including: source colleges and baccalaureate credentials; content of postgraduate education; assignments afloat and ashore; special schooling; qualifications for top ED command and management roles; and all other aspects of professional development which will more clearly define the ED profession. This may take the form of a CNO directive to the Navy so as to eliminate any confusion as to the proper professional role of the ED in the shipbuilding, design, and repair business relative to all other communities who must also be involved.

NOTE: The term ED as used in this report means either the entire 1410 community or a member of this community.

## B. Approach

The Group examined three major areas, all of which stemmed from the Study Directive.

1. Requirements. A review of the need for and role of engineering duty officers.
2. Current Situation. An identification of today's engineering duty officer community structure (bilslets and officers), and an assessment of its capability to meet the Navy's engineering requirements.
3. Changes Required. Identification of future actions required to enhance the engineering duty officer community's ability to meet the requirements.

## C. Constraints

The Group was limited by certain constraints summarized below.

1. The missions of the many commands and organizations in which engineering duty officers serve could not be altered by the Study Group. Engineering duty officers must fill the needed billets of these commands and organizations where criteria for an ED are satisfied.
2. The time period for the study would not permit an exhaustive analysis of every engineering assignment. Analysis was limited to the examination of key billets which influence the number and qualifications of EDs required in the engineering duty community.
3. Solutions for the issues raised in the Study Directive cannot be proven precisely. Study group members' judgment, supported by data derived from analysis and by advice obtained from many experienced and knowledgeable officials, was used to develop recommendations which if properly implemented will provide the improvements sought.

#### D. Methodology

The Group took a direct approach based on today's situation. An analysis was made of how the present engineering duty officer community developed, including a review of relevant past studies. The nature and character of the current ED community was defined in several ways to provide a better understanding. A review of the Navy's current need for EDs was made and the engineering skill and experience of key billets were defined. Heavy reliance was placed on the broad background and experience of the Group members, augmented by interviews and written information from well informed officers and civilians representing broad perspectives in all aspects of the areas examined. Where divergent views were indicated, the Group explored the full spectrum of such views and the supporting rationale so that aspects of the matter in question might be assessed. Recommended actions to achieve the objectives of the Study Directive were formulated and, insofar as possible, checked for feasibility and consistency with other related efforts underway within the Navy.

## SECTION II

### ORGANIZATION AND PERSONNEL STRUCTURE OF THE ENGINEERING DUTY (ED) OFFICER COMMUNITY

#### A. Background

1. Since 1940 the Navy has produced a plethora of studies (about 40 in 36 years) which impact on or relate to the role of engineers and engineering specialists in the Navy. The frequency of these studies suggests discontent with the status quo and a desire to change. Most of the past studies contained specific, detailed recommendations, but failed to identify fundamental causes and long range corrective action. It is important to identify the nature of the discontent if real and lasting corrective action is to be achieved.

2. The fundamental discontent is with the Navy's continuing problems in areas largely within the purview of EDs. This study is a case in point, since the Navy currently has major problems with cost growth in shipbuilding programs and with claims disputes with shipbuilders. Additionally, the readiness of ships and combat systems, adequacy of logistic support, and costs and duration of ship overhauls are other current issues. EDs have responsibilities relating to all these matters; however, many factors contributing to these problems are not under the control of EDs, and actions to increase the professionalism of EDs will not, by themselves, bring complete solutions.

3. The seeds of the EDs' current problems were sown many years ago. The first indications were observed and described accurately by many EDs themselves. As early as 1953, Rear Admiral Wheelock, retiring as Inspector General, BUSHIPS, wrote:

"My enduring concern is for the future of the ED officer group. Diversion of ED officer resources. . .may constitute a hidden threat of significant proportions. There have arisen many diversions which keep ED officers from the practicing of their engineering and architectural professions. The disturbing point is that management proficiency is becoming more highly regarded than technical proficiency."

4. The trend identified by Admiral Wheelock flourished so rapidly that only six years later the concept of EDs as managers rather than technical experts led the Franke Board to conclude that most of the work being done by EDs could be done just as well by URL officers with some postgraduate education. Although this proposal was not adopted at the time, intensified emphasis on management at the expense of technical excellence occurred in many areas. EDs were trained in an atmosphere that indicated there was no need for them to get personally involved in technical details. Thus, after many years most EDs exhibit a reduced capability for the authoritative technical leadership that once was their heritage and their reason for existence. There is an increasing tendency among today's young EDs to perceive that the road to success lies through management of the problem rather than through hands-on involvement grounded in fundamental technical excellence.

5. This perception may be part of a general problem that pervades the entire Navy. The central issue is that ships are complex technical machines that require technically trained professional officers to operate and maintain them, as well as to design and build them. The idea that naval officers should be technically oriented professionals who know the details of their ships was overtaken by the notion that naval officers should be managers. The fundamental principle that responsible officers, ED or URL, need to be knowledgeable enough of technical problems to identify specific corrective action, then plan, supervise and follow up to ensure that this gets done--no more and no less--was lost to a theory that promised results for reduced effort. A program to enhance ED professionalism is a necessary step, but must proceed in coordination with other action moving the Navy toward an increased level of technical competence.

## B. Need for Engineering Duty Officers

1. The determination of the Navy's requirements for EDs was the first major task stemming from the Study Directive. These requirements are related to the current and future roles of EDs. The first step in this task was to categorize current major skills and career paths of EDs and their relation to the Navy's needs for technical expertise in various kinds of ships and activities. Skills were divided into four specific career fields: ship, ordnance, electronics and the special field of explosive ordnance disposal.

2. Figure II-1 presents, in matrix form, ED skills and career fields. The matrix presents numerically the essentiality of the ED role. The number 1 indicates applications where the Navy requires a unique level of knowledge in design, acquisition and maintenance. In increasing numerical value, the matrix indicates those applications where unique knowledge is less essential. Completing the matrix are those skills where no plausible unique requirement for an ED could be identified, i.e., the skill is available from other sources.

3. Using this matrix and a subjective knowledge of the technological growth reasonably expected in the next two decades, the sense of the Group was that EDs were required in the Navy, provided an identifiable, manageable organizational structure emerged from other parallel study efforts. Major importance was attached to the fact that without exception all personnel, senior and junior naval officers and civilians, interviewed or submitting written comments to the Group, confirmed this tentative conclusion.

## ED SKILLS AND CAREER FIELDS

SKILL	ORDNANCE											
	SHIP				ELECTRONICS				SPECIAL			
	NAVAL ARCHITECTURE	PROPELLION	AUXILIARY SYSTEMS	DIVING & SALVAGE	COMBAT SYSTEMS	SENSORS	ELECTRONIC WARFARE	COMMUNICATIONS	COMMAND AND CONTROL	SURVEILLANCE	EXPLOSIVE ORDNANCE DISPOSAL	
CV/LPH	1	1	1	0	1	1	1	1	1	1	0	
SSN/SSBN	1	1	1	0	1	1	1	1	1	1	0	
CG/DD	1	1	1	0	1	1	1	1	1	1	0	
COMBAT CRAFT	1	1	1	0	1	1	1	2	1	0	0	
LST/LSD ETC.	1	2	1	0	1	2	2	2	2	0	0	
AD/AS/AR ETC.	2	2	2	2	1	3	2	2	2	0	0	
ASR/ARS ETC.	2	4	1	1	0	1	3	2	3	0	0	
AK/AO ETC.	3	3	2	0	1	2	4	2	3	0	0	
CRAFT	4	4	4	0	0	4	0	4	0	0	0	
EOD TEAM	0	0	2	2	0	0	0	0	0	0	1	
SHORE	0	0	0	3	0	0	0	3	1	1	1	

CODE	MEANING
1	SKILL IS UNIQUELY ASSOCIATED WITH THE NAVAL ESTABLISHMENT. SKILL MUST EXIST WITHIN NAVY RESOURCES.
2	SKILL IS GENERALLY AVAILABLE FROM OTHER THAN NAVAL SOURCES; HOWEVER, A SIGNIFICANT DEGREE OF DEVELOPMENT IS REQUIRED FOR NAVY USE.
3	SKILL IS AVAILABLE FROM OTHER THAN NAVAL SOURCES AND WITH ONLY MINOR CHANGES IS USABLE IN THE NAVY.
4	SKILL FROM OTHER THAN NAVAL SOURCES IS USABLE DIRECTLY IN THE NAVY.
0	THE SKILL IS NOT REQUIRED IN THIS NAVY USE.

Figure II-1

### C. Personnel Structure

1. General. Detailed information considered to be the most important in evaluating the organization and personnel structure of the ED community is presented at the end of this section as follows:

#### Figure

<u>Figure</u>	<u>Title</u>
II-4	Selected ED Captain Experience
II-5	Number of Annual Transfers Into ED Community by Commissioning Source
II-6	Percent of Annual Transfers Into ED Community by Commissioning Source
II-7	USNA Class Standing by Calendar Year of Transfer Into ED Community

#### Table

<u>Table</u>	<u>Title</u>
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II-2	ED Community (Billets and Officers) by Rank
II-3	ED Community by Rank and Specialty (Billets and Officers)
II-4	ED Community by Rank and Function
II-5	ED Community Education Data
II-6	ED Community Source of Commission by Current Year Group
II-7	ED Community by Calendar Year of Transfer and Source of Commission
II-8	USNA Academic Performance
II-9	Year of Transfer by Original Year Group
II-10	Career Profile (ED Captains) by Experience Area

The present ED community consists of 1,409 billets in 274 activities. The historical practice of obtaining the majority of ED candidates by transfer of URL officers primarily in grades of lieutenant and lieutenant commander, produces unusual but not unexpected grade distribution, e.g., there are 471 lieutenant commander and only 213 lieutenant billets.

2. Major Personnel Trends. In an effort to evaluate trends in the ED personnel structure Figures II-2 and II-3 were prepared based on the data contained in Tables II-6 and II-8. This information, together with that of Tables II-5 through II-9, indicates:

a. Since 1967, the number of USNA graduates transferring to the ED community has declined significantly. Moreover, in relative terms, since 1968 USNA graduates have generally comprised a decreasing fraction of total annual ED accessions.

b. For several years it has been the practice to select some officers who have had more than fifteen years service. Acceptance at this career point reduces an officer's opportunity to obtain the requisite technical education and experience needed to function effectively as an ED.

c. Input from NESEP sources began in 1963 and now these officers form a significant segment of the community; 32% in YG-63 and junior, and 15% of the entire ED community. These officers are eligible for retirement earlier than their contemporaries. For example, of the 30 NESEP officers in YG-66, one has retired, two are presently eligible to retire, and the remaining 27 reach retirement eligibility no later than 1981. The possibility of early retirements can have significant long range effect on the ability of the community to fulfill assigned roles.

d. Meaningful profiles of undergraduate academic achievement of EDs could not be obtained except for the USNA graduates. In the case of USNA graduates in the ED community a significant change in academic potential has occurred. Class standing of these graduates transferring to ED has declined. No active duty ED in YG-55 stood in the bottom half of the class; 40% of the EDs in YG-63 stood in the bottom half of their class. EDs with class standing in the upper 20% have declined from 73% in YG-55 to 24% in YG-63.

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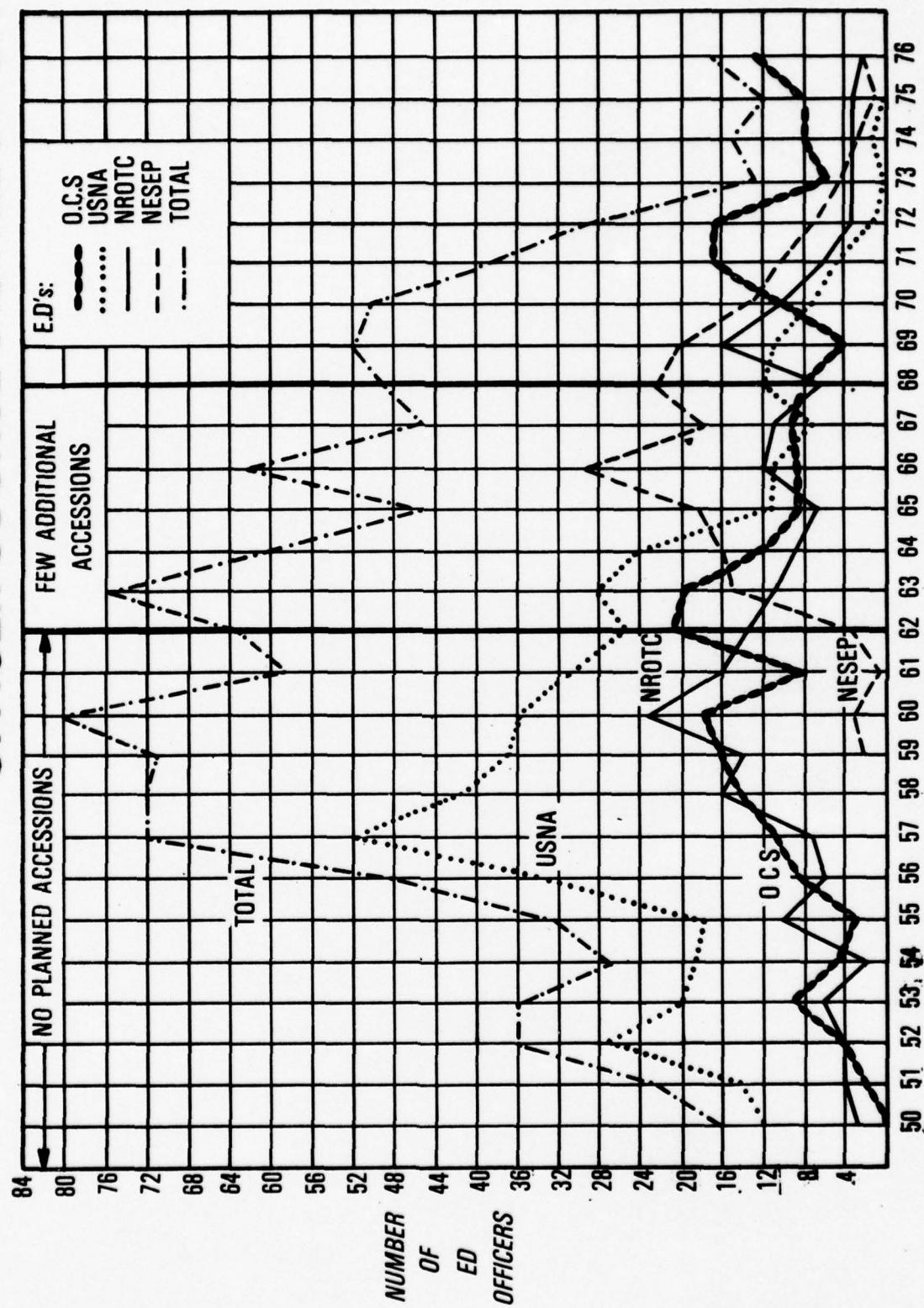


Figure II-2  
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# NAVAL ACADEMY ENGINEERING DUTY OFFICER ACADEMIC PERFORMANCE

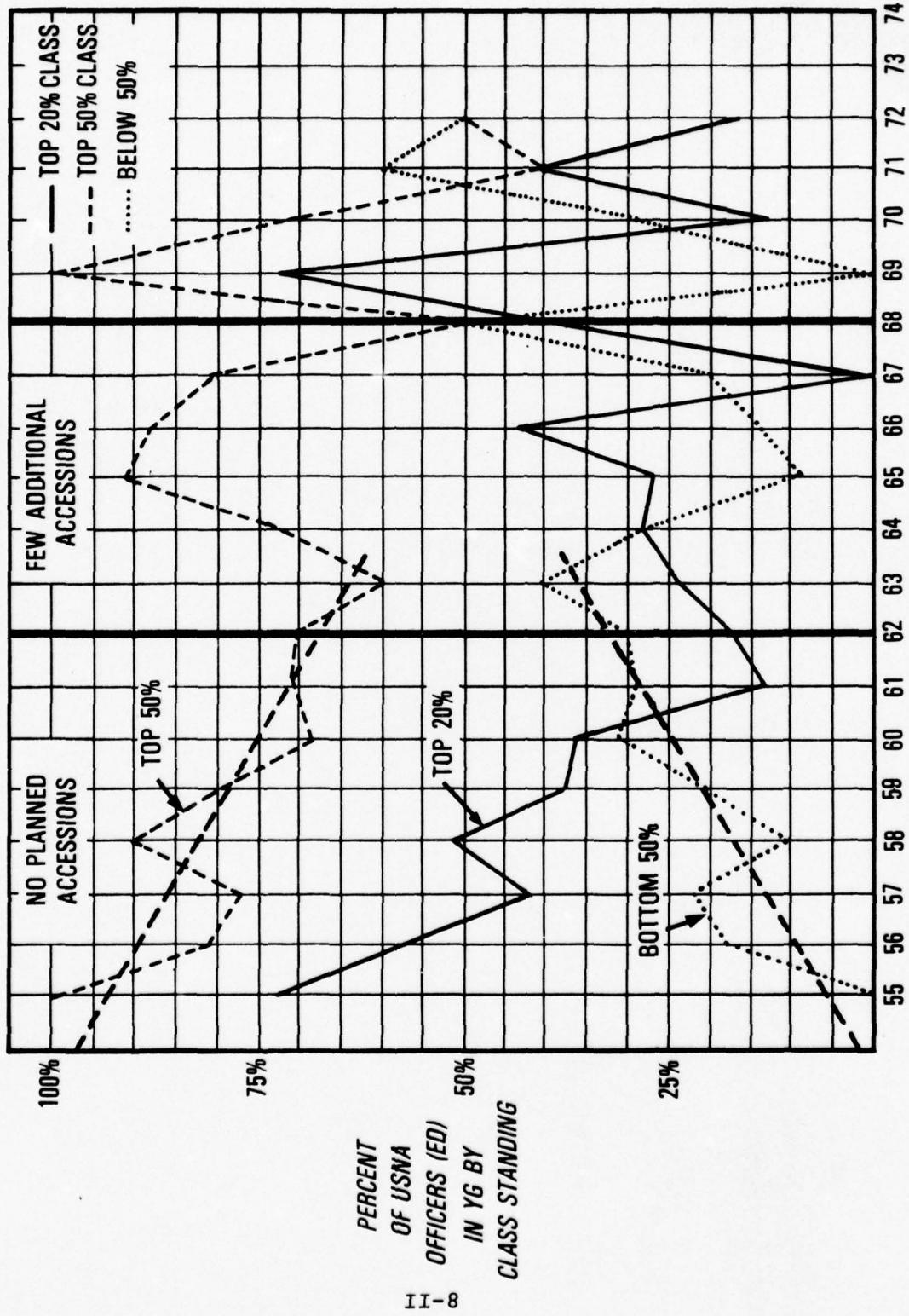


Figure II-3

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e. The following observations can be made with regard to graduate engineering training:

(1) Approximately 25% of EDs have less than a Master's degree. About half of these are lieutenant or below; most of these are in or will enter graduate training.

(2) Significant numbers of EDs have obtained advanced degrees in non-technical disciplines.

### 3. General Personnel Items

a. Distribution of EDs closely matches billets. However, there are 150 fewer officers than billets; a shortfall of 93 commanders exists.

b. Approximately 10% of ED billets are at sea.

c. A comparison of billet subspecialty codes with numbers of officers indicates a significant shortage of officers in the ordnance career field and surpluses in the fields of ships and electronics (see Table II-3). Two things should be noted, however:

(1) The ordnance numbers in Table II-3 include 44 EOD officers and 63 EOD billets.

(2) Many ship and ordnance coded billets are fully suitable for an electronics specialty. This is particularly true at the junior ranks; for example, ship superintendent or combat systems officer at a naval shipyard.

4. Experience. Figure II-4 and Table II-10 provide selected ED career experience data. Regarding the experience of ED captains, the data indicate:

a. The NAVSEA Ship Acquisition Project Manager has spent the largest portion of his career in maintenance and logistics (36%), a smaller portion in acquisition (21%), and has been in the fleet (15%). Since this career has emerged formally within the last ten years this was not unexpected.

b. By comparison the NAVSEA Combat System Acquisition Project Manager has had more experience in research and development (13% vice 2%) and less in maintenance and logistics (23% vice 36%) than his ship acquisition counterpart.

c. The SHIPYD/SRF CO and SUPSHIPS officers have spent significant portions of their careers in maintenance and logistics (46% for SHIPYD/SRF CO and 38% for SUPSHIPS) and have considerable fleet experience (21% for SHIPYD/SRF CO and 23% for SUPSHIPS).

d. The NAVELEX headquarters captain has his greatest experience in maintenance and logistics (38%) followed by acquisition (18%) and research and development (14%). This captain has less fleet (9%) experience than the typical captain on duty in NAVSEA.

e. ED captains are not assigned NAVELEX project management billets; these billets are filled by URL or aeronautical engineering duty captains.

f. The fleet staff captain has spent most of his career in maintenance and logistics (54%) and in the fleet (30%).

g. A laboratory captain has the most research and development experience (15%) of all groups. He also has considerable fleet experience (30%).

h. The average ED captain is heavily experienced in maintenance and logistics.

## SELECTED ED CAPTAIN EXPERIENCE

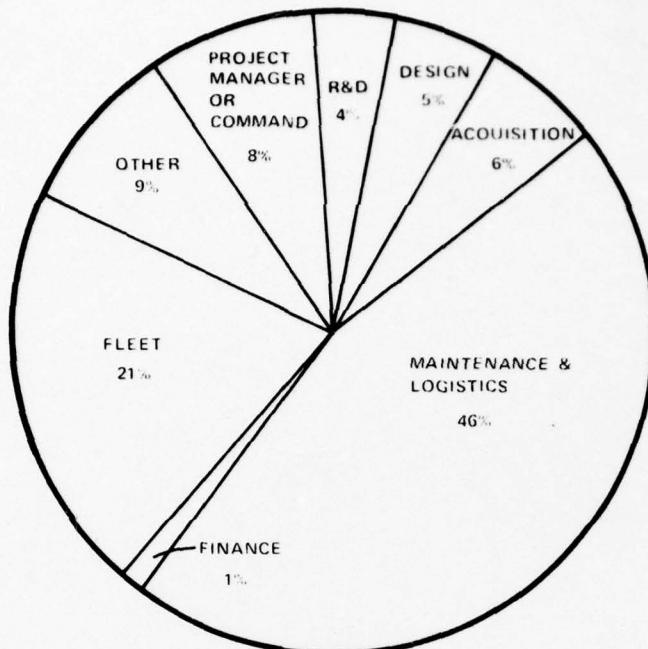


FIGURE II-4A  
EXPERIENCE - CAPTAIN  
SHIPYD/SRF CO

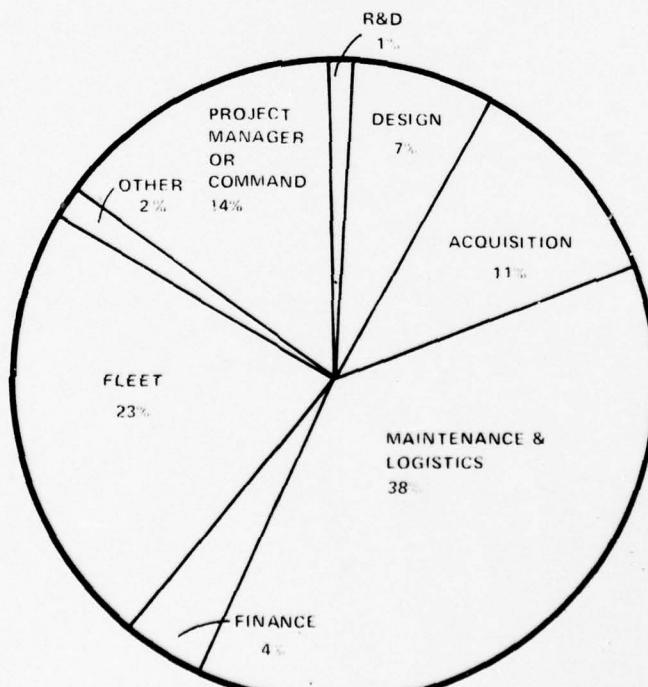


FIGURE II-4B  
EXPERIENCE - CAPTAIN  
SUPSHIPS

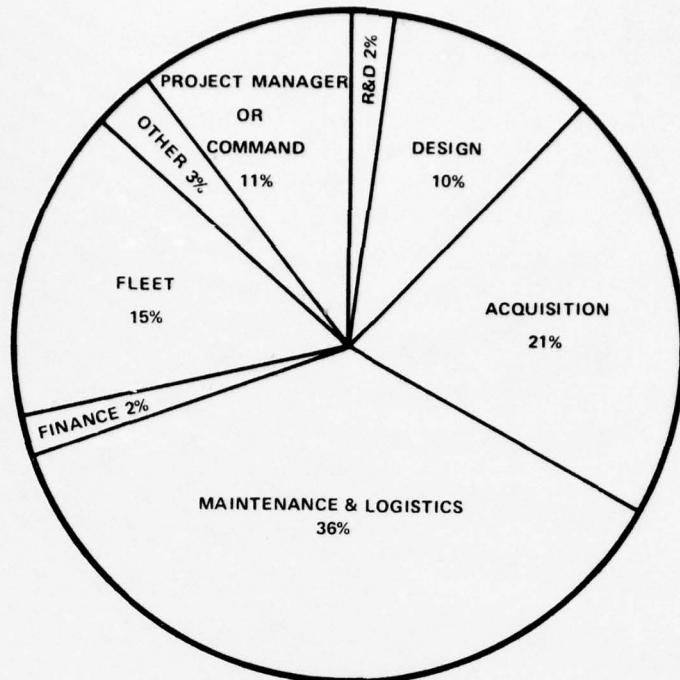


FIGURE II-4C  
EXPERIENCE - CAPTAIN  
NAVSEA PROJECT MANAGER  
SHIP ACQUISITION

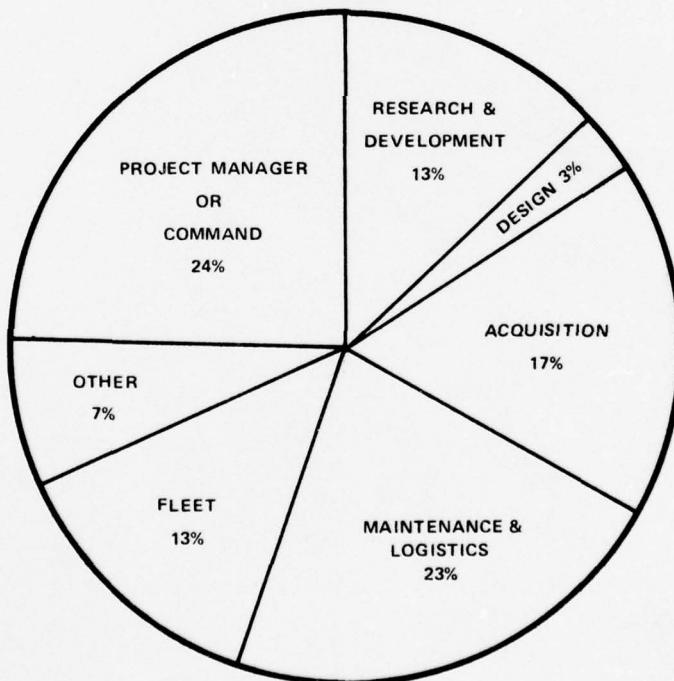


FIGURE II-4D  
EXPERIENCE - CAPTAIN  
NAVSEA PROJECT MANAGER  
COMBAT SYSTEM ACQUISITION

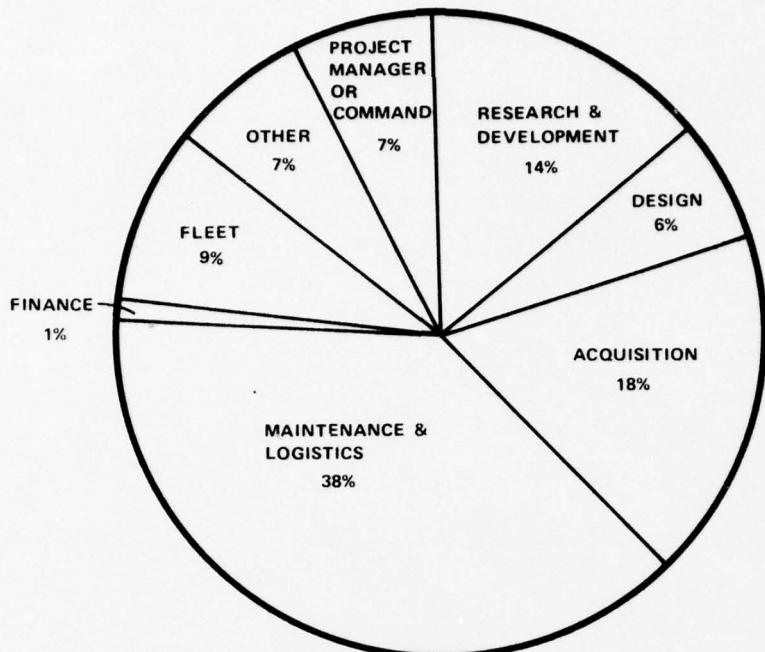


FIGURE II-4E  
EXPERIENCE - CAPTAIN  
NAVELEX OTHER

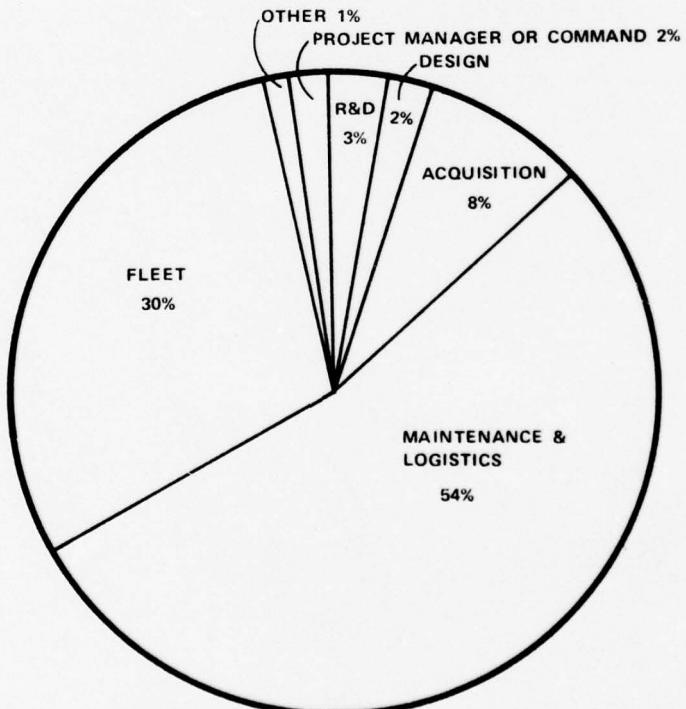


FIGURE II-4F  
EXPERIENCE - CAPTAIN  
FLEET STAFF

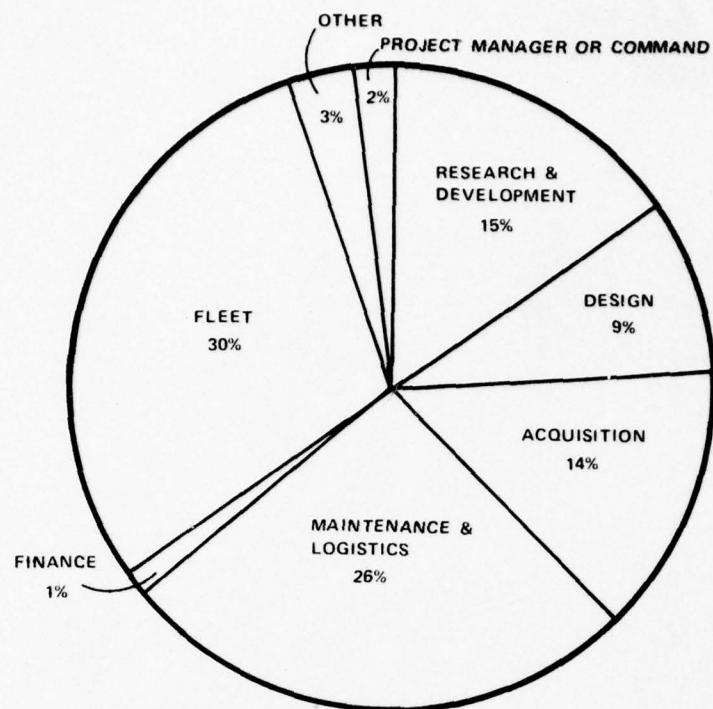


FIGURE II-4G  
EXPERIENCE - CAPTAIN  
LABORATORIES

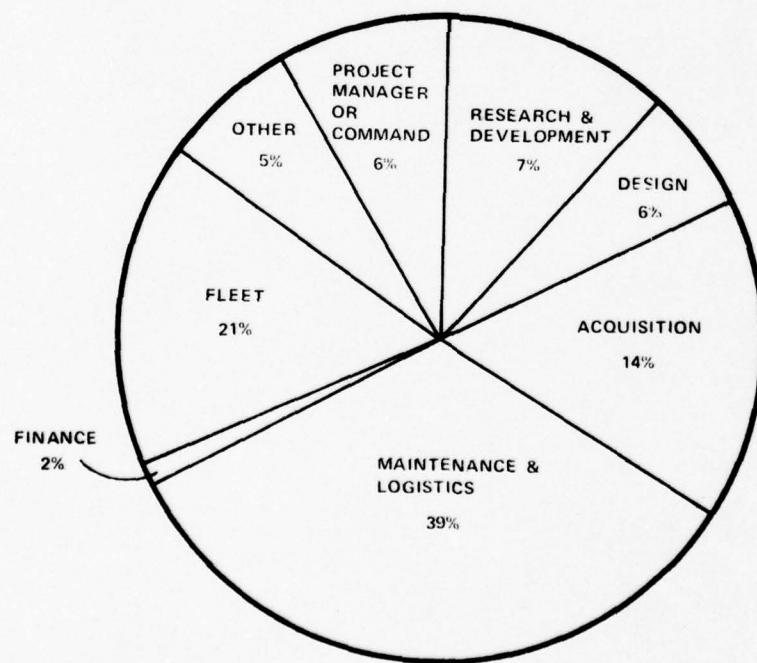


FIGURE II-4H  
EXPERIENCE - CAPTAIN  
AVERAGE CAPTAIN

**NUMBER OF ANNUAL TRANSFERS INTO ED COMMUNITY  
BY COMMISSIONING SOURCE**  
*(PRESENT ACTIVE DUTY EDs)*

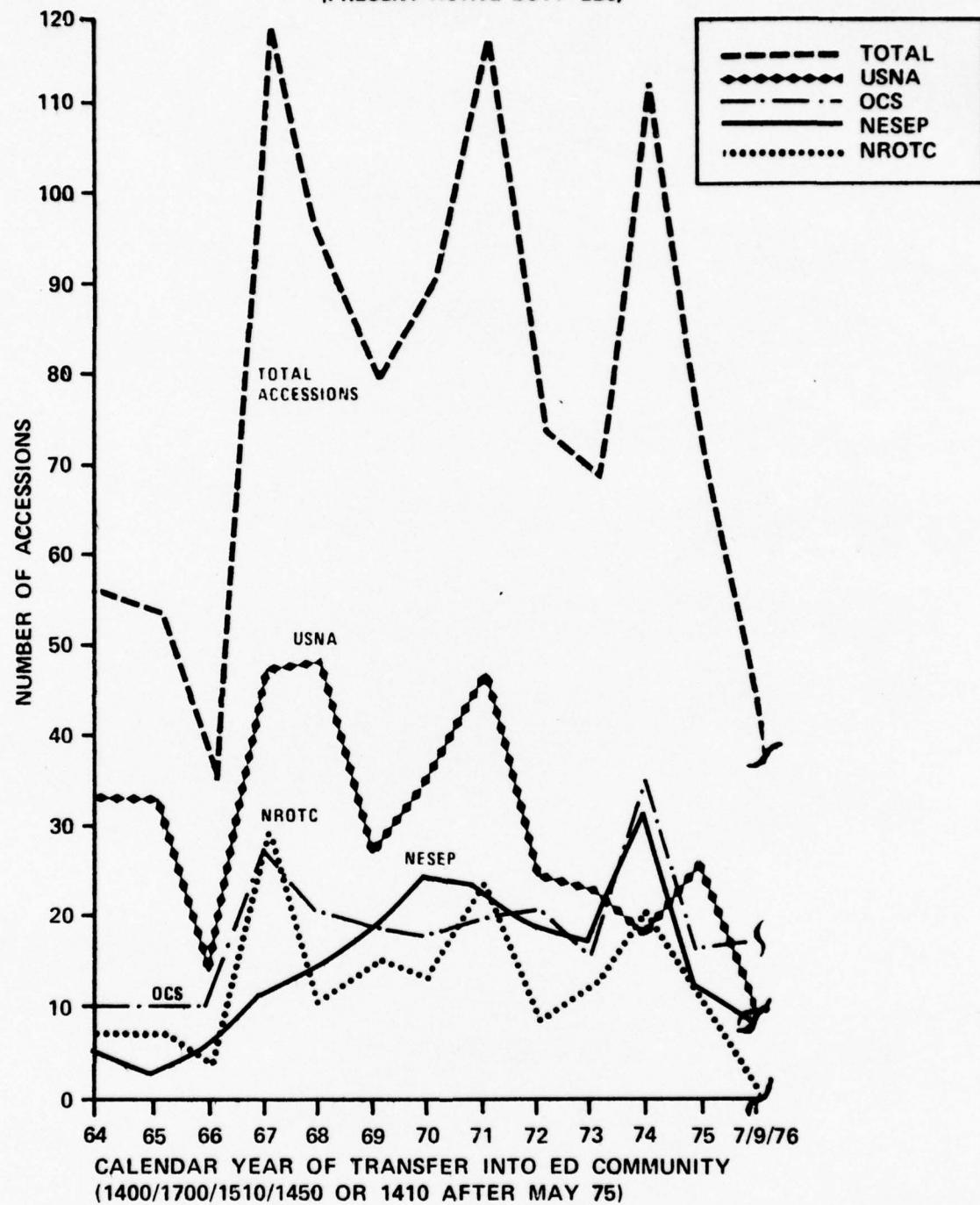


Figure II-5

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**% OF ANNUAL TRANSFERS INTO  
ED COMMUNITY BY COMMISSIONING SOURCE**  
*(PRESENT ACTIVE DUTY EDs)*

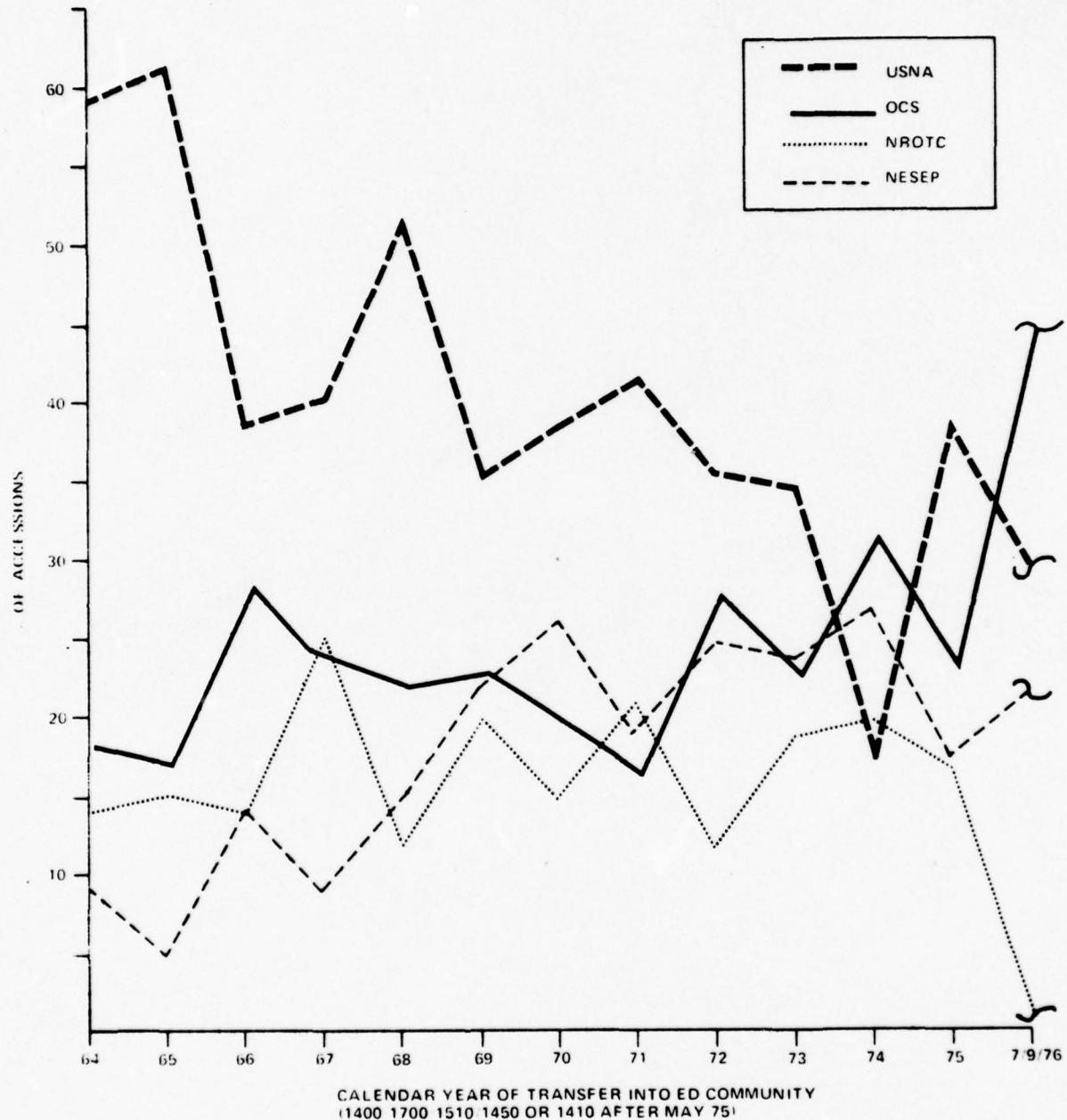


Figure II-6

**USNA CLASS STANDING BY  
CALENDAR YEAR OF TRANSFER INTO ED COMMUNITY  
(PRESENT ACTIVE DUTY EDs)**

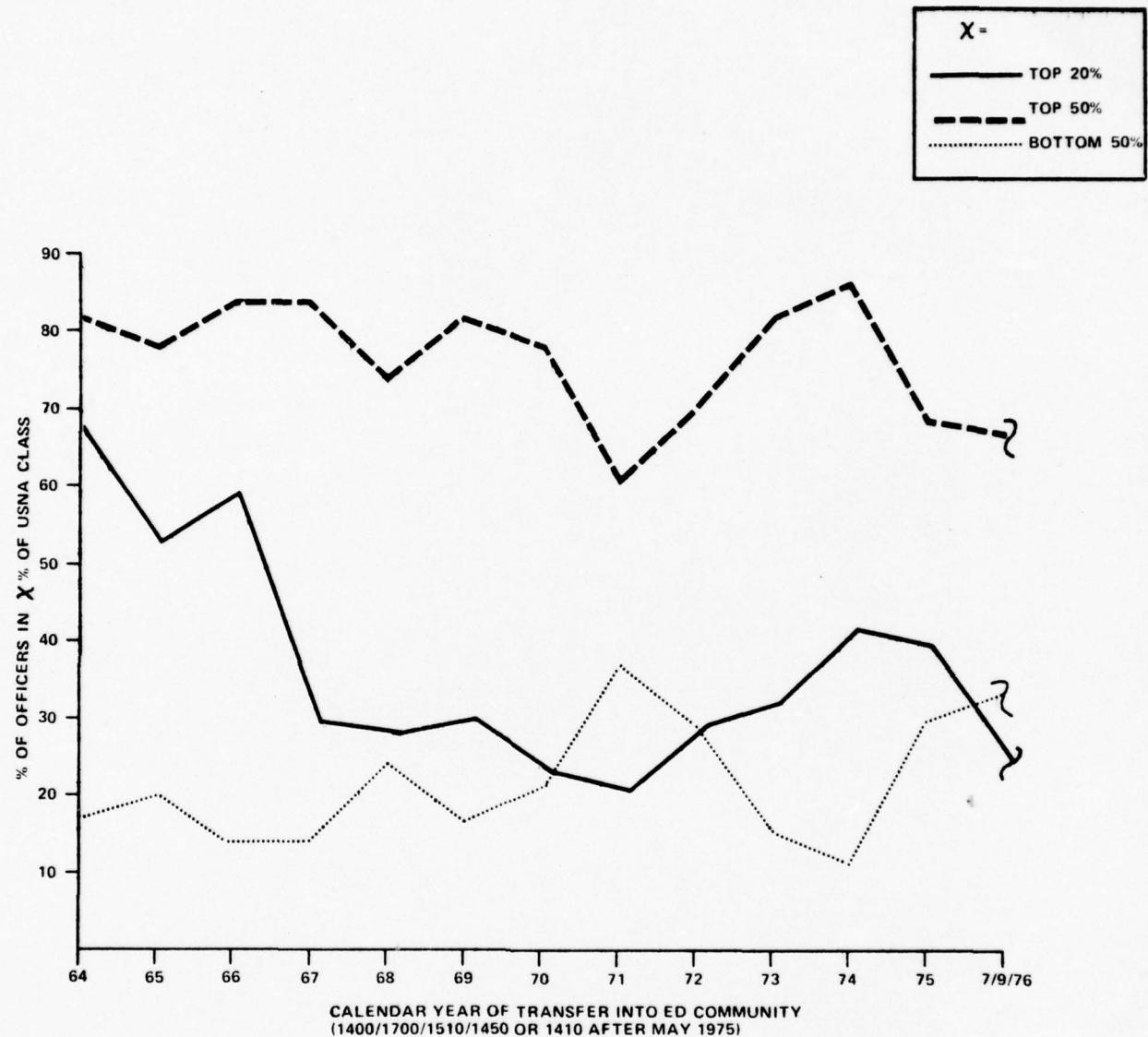


Figure II-7

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## TABLES OF SECTION II

NOTE: Tables II-1 through II-10 are statistical representations of the active duty ED community as it existed on 9 July 1976. They were compiled from Officer Data Card, billet, and officer precedence computer listings that were updated and corrected to that date.

### Sources of Data:

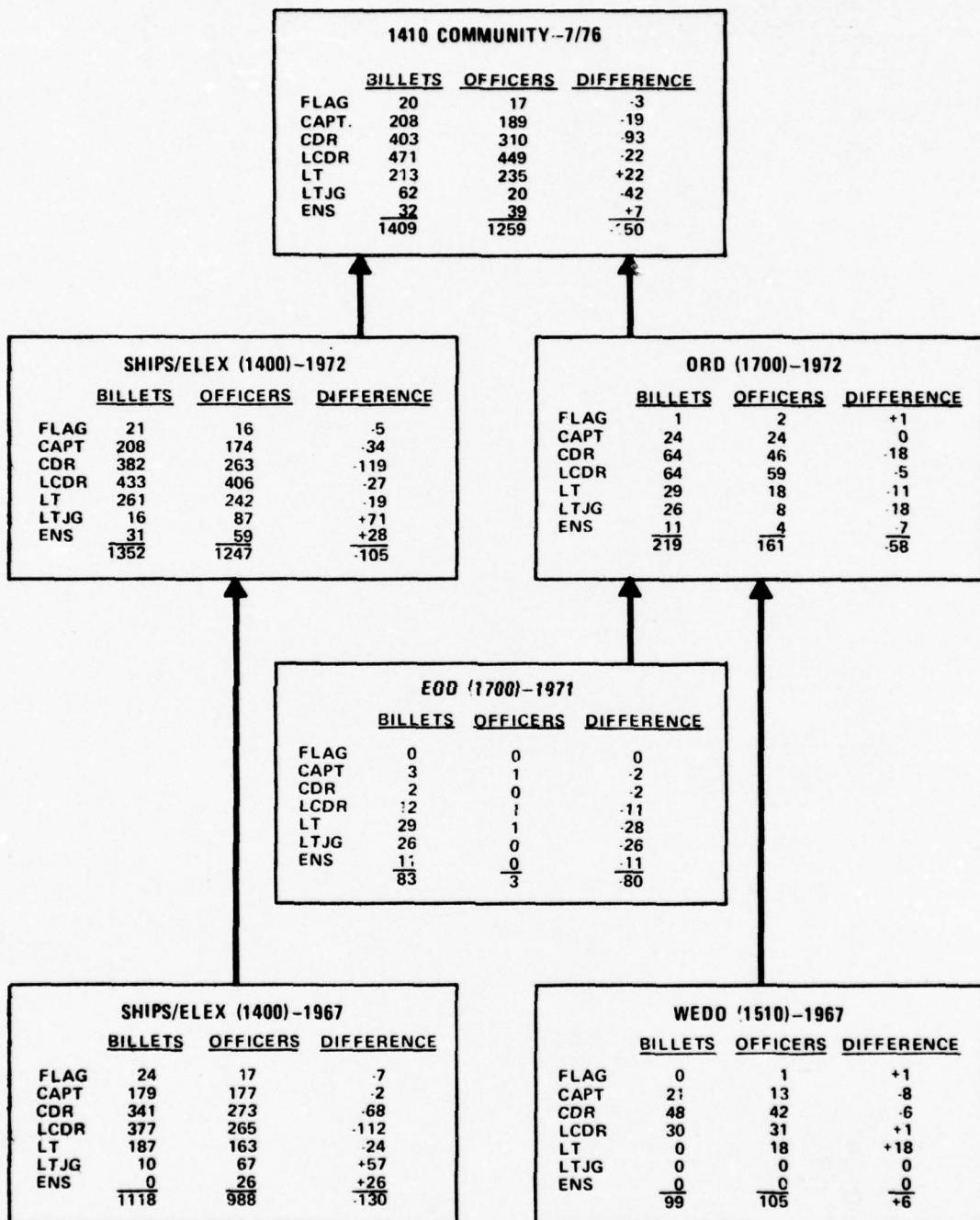
1. ED Officer Data Cards:  
Alphabetical listing dated 27 July 1976,  
Precedence listing dated 4 August 1976.
2. OPNAV (OP-102) MAPMIS ED Billet listing  
dated 30 June 1976.
3. BUPERS ED Precedence Report dated  
9 July 1976.
4. USNA Register of Alumni, 1976 issue.
5. Directory of Engineering Duty Officers,  
October 1975.
6. Directories of Weapons Engineering Duty  
Officers and Ordnance Engineering Duty  
Officers, issues dated 1963 through 1975.

**TABLE II-1**  
**ED COMMUNITY BY RANK AND ORGANIZATION**

ORGANIZATION	BILLETS							TOTAL BILLETS
	FLAG	CAPT	CDR	LCDR	LT	LTJG	ENS	
NAVSEA	5	49	62	26	3			145
NAVSEC	1	9	21	16	1			48
NAVELEX	3	10	14	10	2			39
OPNAV/CNM/PM	1	14	15	16				46
NSYD/SRF	4	34	74	135	51	1		299
SHIP			26	40	18	32	25	141
SUPSHIP	2	14	39	53	34	1		143
ORD FIELD			9	12	10	1		32
ELEX FIELD			7	14	4	2		27
NAVSEC FIELD			2	4	4			10
NAVREACT	1	3	16	13	15			48
EOD FIELD			3	3	7	14	21	52
NPRO/DCAS/TECHREP			3	4	5	1		13
LABORATORY			7	13	24	1		45
SCHOOL			4	7	6	48	1	67
OVERSEAS			2	9	8			19
FLEET STAFF	2	16	31	41	3			93
OTHER	1	22	39	53	19	6	2	142
TOTAL	20	208	403	471	213	62	32	1409

NOTE: "OTHER" INCLUDES TP&P

TABLE II-2  
ED COMMUNITY (BILLETS AND OFFICERS) BY RANK



**ED COMMUNITY BY RANK AND SPECIALTY**  
**(BILLETS AND OFFICERS)**

	SHIP	ORD	ELEX	<u>BILLETS</u>			TOTAL
				SHIP/ORD/ ELEX*	STUDENT	TP&P	
FLAG	15	1	3	0	0	1	20
CAPT	123	31	24	20	1	9	208
CDR	256	52	53	23	2	17	403
LCDR	308	58	56	25	4	20	471
LT	104	20	12	16	49	12	213
LTJG	2	21	0	33	1	5	62
ENS	0	4	0	25	1	2	32
	<u>808</u>	<u>187</u>	<u>148</u>	<u>142</u>	<u>58</u>	<u>66</u>	<u>1409</u>

\* BILLETS WERE CLASSIFIED BASED ON THE SUBSPECIALTY CODE ASSIGNED WHERE A GENERAL CODE (OR NO CODE) IS ASSIGNED. BILLETS WERE CLASSIFIED ACCORDING TO THE PRINCIPAL EXPERIENCE FIELD REQUIRED. BILLETS IN THIS COLUMN CAN BE PROPERLY FILLED BY TWO OR MORE OF THE SHIP ORD/ELEX CATEGORIES

	SHIP	ORD	ELEX	<u>OFFICERS</u>			TOTAL
FLAG	13	3	1				17
CAPT	122	28	39				189
CDR	223	40	47				310
LCDR	287	48	114				449
LT	153	38	44				235
LTJG	11	5	4				20
ENS	<u>28</u>	<u>1</u>	<u>10</u>				<u>39</u>
	<u>837</u>	<u>163</u>	<u>259</u>				<u>1259</u>

**TABLE II-4**  
**ED COMMUNITY BY RANK AND FUNCTION**

FUNCTION	BILLETS							TOTAL BILLETS
	FLAG	CAPT	CDR	LCDR	LT	LTJG	ENS	
COMMAND AND SENIOR MANAGEMENT	11	34						45
RESEARCH AND DEVELOPMENT	1	10	19	31	1			62
TEST AND INSPECTION		7	8	20	1			36
SHIP DESIGN		6	11	10				27
COMBAT SYSTEM DESIGN			3	6	4			13
ELECTRONICS DESIGN			1	4	1			6
SHIP ACQUISITION (HQ)		20	17	4	1			42
SHIP ACQUISITION (FIELD)		6	24	26	19			75
COMBAT SYSTEMS ACQUISITION (HQ)	1	12	19	13	1			46
COMBAT SYSTEMS ACQUISITION (FIELD)			3	5	6	1		15
ELECTRONICS ACQUISITION (HQ)	1	7	15	8	2			33
ELECTRONICS ACQUISITION (FIELD)		2	5	2	3			12
SHIP REPAIR (INDUSTRIAL)		27	111	180	67	3		388
ENGINEERING SUPPORT		4	20	19	1			44
ORDNANCE INDUSTRIAL		2	11	6				19
OTHER MAINTENANCE/LOGISTIC SUPPORT	5	37	55	50	3			150
EXPLOSIVE ORDNANCE DISPOSAL		3	4	10	17	21	4	59
DIVING AND SALVAGE		1	5	11	1			18
FINANCIAL MANAGEMENT		1	1					2
CONTRACTS		2		1	1			4
NUCLEAR		3	16	13	15	1	1	47
SCHOOLS (STAFF AND STUDENTS)		4	7	5	48			66
FLEET			14	27	18	32	25	116
OTHER		4	9	4	1			18
TRANSIENTS, PATIENTS AND PRISONERS	1	9	17	20	12	5	2	66
	20	208	403	471	213	62	32	1,409

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## ED COMMUNITY EDUCATION DATA

TABLE II-5A BILLETS

	PHD	ENG	MS	< MS
CAPT	8	8	164	28
CDR	10	74	238	81
LCDR	4	88	285	94
LT	0	10	46	157
TOTAL	22	180	733	360

NOTE: FLAG, LTJG, AND ENS. BILLETS ARE NOT CODED (CNO POLICY)

TABLE II-5B OFFICER LEVEL OF EDUCATION

	PHD	ENG	DUAL MASTERS/ ENG	MASTERS	< MASTERS
FLAG	0	7	0	8	2
CAPT	9	39	19	91	31
CDR	22	67	16	155	50
LCDR	13	107	36	232	61
LT	10	19	7	84	115
LTJG	0	0	0	1	19
ENS	0	0	0	5	34
TOTAL	54	239	78	576	312*

\*APPROXIMATELY 170 OFFICERS ARE NOW IN OR AWAITING  
ASSIGNMENT TO ACADEMIC PROGRAMS LEADING TO AN  
ADVANCED DEGREE

TABLE II-5C LEVEL OF EDUCATION BY YEAR GROUP

YG \ LEVEL OF EDUCATION	PHD	ENG	DUAL	MASTERS	<MASTERS	YG TOTALS
45				1	1	2
46			1	2	1	4
47		3	1	4	2	10
48		2		3		5
49		5	4	11	2	22
50	1	5	2	7	1	16
51	1	6	2	9	4	22
52	2	5	4	22	3	36
53	1	5	2	18	10	36
54	3	4	1	14	5	27
55	1	5	2	16	8	32
56	1	15	4	19	9	48
57	2	23	5	29	13	72
58	4	17	5	38	8	72
59	6	10	2	40	13	71
60	8	14	3	42	13	80
61	2	11	3	36	6	58
62		12	6	40	5	63
63	5	22	6	37	6	76
64	1	20	6	32	5	64
65	4	10	4	20	7	45
66	2	15	8	21	16	62
67	4	11	1	22	7	45
68		5	2	28	14	49
69	1	6	3	22	20	52
70	4	1		18	25	48
71			1	8	30	39
72	1			5	23	29
73					13	13
74				1	14	15
75				2	10	12
76				2	15	17
	54	232*	78	569*	309*	1242*

\*DOES NOT INCLUDE FLAG OFFICERS. FLAG OFFICER LEVEL OF EDUCATION IS AS FOLLOWS: ENG-7

MASTERS-8

<MASTERS-2

**TABLE II-5D ADVANCED DEGREE ACADEMIC SPECIALTY**

ADVANCED DEGREE	FLAG	CAPT	CDR	LCDR	LT& BELOW	TOTAL
NAVAL ARCHITECTURE/MARINE ENGINEERING	9	63	87	90	18	267
MECHANICAL ENGINEERING	2	15	41	84	28	170
ELECTRICAL ENGINEERING	1	9	20	32	13	75
ELECTRONICS ENGINEERING	0	24	25	51	16	116
ORDNANCE ENGINEERING	2	21	18	39	4	84
OTHER TECHNICAL/ENGINEERING	0	14	36	59	38	147
NON TECHNICAL*	1	12	33	33	9	88
NO ADVANCED DEGREE	2	31	50	61	168	312

\*THIS CATEGORY DOES NOT INCLUDE 65 OFFICERS WHO HOLD ADVANCED NON-TECHNICAL DEGREES IN ADDITION TO ADVANCED TECHNICAL DEGREES.

**TABLE II-5E SOURCE OF ADVANCED DEGREE**

SCHOOL	FLAG	CAPT	CDR	LCDR	LT& BELOW	TOTAL
NAVAL POST GRADUATE SCHOOL	2	69	132	250	40	493
MASS. INSTITUTE OF TECHNOLOGY	11	55	79	85	19	249
WEBB INSTITUTE OF TECHNOLOGY	0	13	37	6	0	56
OTHER	2	21	12	47	67	149

TABLE II-6  
ED COMMUNITY SOURCE OF COMMISSION BY  
CURRENT YEAR GROUP

SOURCE YG \	OCS	USNA	NESEP	NROTC	OTHER	TOTAL
45		2				2
46		4				4
47		8			2	10
48		4		1		5
49	2	20				22
50		12		3	1	16
51	2	14		4	2	22
52	4	27		4	1	36
53	9	20		6	1	36
54	5	19		2	1	27
55	3	18		10	1	32
56	9	33		6		48
57	11	52		7	2	72
58	15	41		16		72
59	16	37	2	14	2	71
60	18	36	3	23		80
61	8	31	1	16	2	58
62	21	25	3	14		63
63	20	28	15	11	2	76
64	12	24	16	9	3	64
65	9	11	18	7		45
66	9	11	30	12		62
67	10	7	17	11		45
68	8	12	22	6	1	49
69	4	11	20	16	1	52
70	13	7	17	10	1	48
71	17	5	10	6	1	39
72	17	1	7	?	1	29
73	6		4	3		13
74	8	1	3	3		15
75	8		1	3		12
76	13		2	2		17
TOTALS	277	521	191	228	25	1242*

\*DOES NOT INCLUDE FLAG OFFICERS

NOTE: A SIGNIFICANT SHIFT IN TRADITIONAL ACCESSION SOURCES  
OCCURRED WITH YG 1963

**TABLE II-7**  
**ED COMMUNITY BY CALENDAR YEAR OF TRANSFER**  
**AND SOURCE OF COMMISSION**

CALENDAR YEAR OF TRANSFER INTO 1400/1700/1510/1450 COMMUNITY (OR 1410 AFTER MAY 1975)	SOURCE OF COMMISSION						<b>TOTAL</b>
	OCS	USNA	NESEP	NROTC	OTHER		
1955		10		1			11
56	5	9					14
57	3	10					13
58	8	7		2			17
59	5	8		3			16
60	5	9		1			15
61	5	11		6			22
62	6	13		8			27
63	16	22	2	9			49
64	10	34	5	8			57
65	10	33	3	8	1		55
66	10	14	5	5	2		36
67	28	48	11	30	2		119
68	21	49	14	11			95
69	19	28	18	16			81
70	18	35	24	14	1		92
71	20	48	23	25	2		118
72	21	26	19	9			75
73	16	24	17	13			70
74	36	19	31	23	4		113
75	17	27	13	12	2		71
76	18	12	9	1	1		
						<b>41 TO DATE</b>	
							<b>1207</b>

**NOTE:**

1. NOT INCLUDED IN THIS TABLE ARE:  
17 FLAG OFFICERS, 23 LOSSES SINCE  
7/9/76, AND 12 ACCESSIONS PRIOR TO  
1955.
2. INCLUDED IN THE OCS COLUMN ARE  
ALL THE VARIOUS OC PROGRAMS SUCH  
AS ROC, AOC AND MMOC.

**TABLE II-8**  
**USNA ACADEMIC PERFORMANCE**

USNA CLASS	# IN CLASS	ACTIVE DUTY # EDs IN CLASS	% OF CLASS	% OF EDs IN X% OF CLASS AT USNA				
				X%				
				TOP 5%	TOP 10%	TOP 20%	TOP 50%	BOTTOM 50%
55	742	15	2 %	27	47	73	100	0
56	681	33	4.8	21	24	58	82	18
57	848	51	6	16	27	41	78	22
58	899	39	4.3	8	21	51	90	10
59	799	40	5	15	23	38	80	20
60	797	36	4.4	11	25	36	69	31
61	786	31	3.9	3	6	3	71	29
62	789	23	2.9	9	13	17	70	30
63	871	25	2.8	4	8	24	60	40
64	927	25	2.7	8	16	28	72	28
65	801	11	1.4	9	18	27	91	9
66	868	16	1.8	13	19	44	88	12
67	890	5	0.6	0	0	0	80	20
68	836	12	1.4	17	25	33	50	50
69	880	11	1.2	18	45	73	100	9
70	838	7	0.8	0	14	14	71	29
71	875	5	0.6	0	0	40	40	60
72	905	6	0.7	0	17	17	50	50
73	888	0	0	0	0	0	0	0
74	917	1	0.1	0	0	0	0	100

NOTE:

THE ABOVE STATISTICS ARE BASED ON USNA EDs PRESENTLY ON ACTIVE DUTY.

TABLE II-9

## YEAR OF TRANSFER BY ORIGINAL YEAR GROUP

CALENDAR YEAR OF TRANSFER INTO 1400/1700/1510/1450 COMMUNITY  
(OR 1410 AFTER MAY 1975)

	ORIGINAL YEAR GROUP																															
	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	TOTAL ACCESSIONS
76	17	1		3	5	3	3	2	2		3						1	1													41 *	
75		12	1	4	4	5	11	6	6	5	3	2	1	2	1	1	1	4	1	1									71			
74			13	3	11	11	11	14	12	4	12	7	2	4	4	1	2		1	1								113				
73				2	1	4	4	9	11	6	10	4	5	2	5	2	2	1	1	1								70				
72					9	5	4	8	7	6	7	2	4	8	4	3	2	5			1							75				
71						11	3	3	9	8	15	10	14	9	6	5	8	6	4	1	2	1	1	1	1		118					
70							10		3	8	9	8	11	12	7	11	2	3	3	3	2							92				
69								11		1	6	3	11	6	4	10	9	8	5	1	1		1	2	2			81				
68									3	1	1	2	5	11	8	14	7	14	9	9			6	2	2	1		95				
67										3		1	2	10	14	12	20	14	14	13	2	2		4	4	3	1		119			
66											3	1	1	3	2	2	2	4	6	6	2	1		2	1				36			
65											7	1		3	2	8	4	14	10		2	2	2						55			
64												5			3	6	6	17	9	5	3	2		1					57			
63												5		2	3	1	3	8	6	2	11	2	1	2	1	1	1		49			
62													1			1	2	10	3	4	5									27		
61														1			1	2	4	1	6	4	3						22			
60															1				1											15		
59																1					3	6	3	3						16		
58																4		1		2	1	4	1	3						17		
57																	1		1	3	1	4	1	1	1					13		
56																		1	1	2		4	2		2	2				14		
55																		1	1			1	4	1	1	2				11 **		
54																				1					2					3		
53																			2					1	1	1			5			
52																								1					1			
51																					1					1			2			
50																							1						1			

## NOTES:

1. NOT INCLUDED IN THIS TABLE ARE: 17 ADMIRALS AND 23 LOSSES (RETIREMENTS, RESIGNATIONS, ETC.) SINCE 7/9/76.
2. THE ABOVE STATISTICS REPRESENT THOSE EDS PRESENTLY ON ACTIVE DUTY.
- \*3. FIGURES FOR 1976 ARE AS OF 7/9/76.
- \*\*4. THE SOLID STEPPED LINE REPRESENTS 10 YEARS OF ACTIVE DUTY.

**TABLE III-10**  
**CAREER PROFILE (ED CAPTAINS) BY EXPERIENCE AREA**

EXPERIENCE (% OF CAREER)	CURRENT BILLET	SAMPLE SIZE	PROJECT MANAGER OR MANAGER OF COMMAND											
			SHIPBOARD CONTRACTING			FINANCIAL ACQUISITION			LOGISTICS & MAINTENANCE			DESIGN		
NAVSEA PROJECT MANAGER														
(1) SHIP ACQUISITION	19	2	10	21	36	2	0	15	3	11				
(2) COMB. SYS. ACQUISITION	5	13	3	17	23	0	0	13	7	24				
NAVSEA OTHER														
SUPSHIPS	28	8	5	13	42	3	0	23	4	2				
SHPYD/SRF (1) CO (2) DEPARTMENT HEAD	9	4	5	6	46	1	0	21	9	8				
	23	1	4	9	51	2	0	25	6	2				
SUPSHIPS	12	1	7	11	38	4	0	23	2	14				
NAVELEX (1) PROJECT MANAGER (2) OTHER (3) FIELD	0	0	0	0	0	0	0	0	0	0				
	7	14	6	18	38	1	0	9	7	7				
	4	24	2	18	20	0	0	24	4	8				
NAVSEC														
ORDNANCE FACILITIES	8	12	16	12	27	4	0	18	3	8				
STRATEGIC OFFICES	7	21	6	28	22	0	0	15	6	2				
FLEET STAFFS	4	29	3	25	22	2	2	11	0	6				
LABS	17	3	2	8	54	0	0	30	1	2				
NAVPRO	9	15	9	14	26	1	0	30	3	2				
INSURV/OPTEVFOR/PEB	3	13	6	35	0	0	0	0	0	35	11			
AVERAGE CAPTAIN	4	0	0	15	47	1	0	13	12	12				
	159	7	6	14	39	2	0	21	5	6				

NOTE: THIS DATA WAS DEVELOPED FROM APPLICABLE OFFICER DATA CARDS FROM ED CAPTAINS AND COVERS APPROXIMATELY 15 YEARS OF SERVICE

EXAMPLE: THE TYPICAL SHPYD/SRF CO HAS SPENT 4% OF THE LAST 15 YEARS OF HIS CAREER IN R&D, 5% IN DESIGN, 6% IN ACQUISITION, 46% IN MAINTENANCE/LOGISTICS, ETC.

## SECTION III

### ROLE OF THE ED

#### A. General

1. There is no formal Navy role documented for the ED. In the broadest sense, the role should be to exercise responsibility, within the constraints of assigned authority, for the technical aspects of ships and combat systems. Effective exercise of this responsibility requires an ED community of highly trained, experienced professional naval engineers to technically direct the design, acquisition and maintenance of ships and combat systems. Members of this community must perform effectively:

- first - as naval officers,
- second - as a community of professional engineers specializing in ships and combat systems,
- third - stemming from both the above, as individuals accepting responsibility for technical matters in all assignments.

The ED roles discussed below are those identified either in the Study Directive or by the Study Group as requiring clarification.

B. The Role of the ED as a Professional Naval Engineer

1. The ED performs this role in both surface ship and submarine applications and, in concert with other Navy communities, provides technical leadership and direction for ship and specified shore based systems.

2. A number of actions are required if all EDs are to achieve the high level of technical competence required of this role. Section II addressed the reduced emphasis on the technical aspects of ED performance because of undue attention directed to management and administrative skills. The following are also relevant:

a. Officers should have a Bachelor's degree in a technical or engineering field prior to acceptance as an ED.

b. EDs should acquire advanced education in a technical or engineering field directly applicable to ships or combat systems.

c. EDs should complete the recently established Engineering Duty Officer Basic Qualification Program during the early period of their career.

d. These ED technical qualifications determine the fundamental ability of the ED to fulfill the basic role. It is also important to recognize that implicit in the term professional naval engineer is the ability to direct an engineering organization, project, shipyard, or laboratory.

3. It is in the role of professional engineer that the primary interface between the ED and URL subspecialist occurs. Cooperation can only be achieved from positions of mutual respect. The URL subspecialist's primary Navy role is in naval warfare; however, the Navy depends on technical contribution from URL officers during technical assignments ashore. OPNAV Instruction 1211.6E promulgates the subspecialty concept. Concurrent with increasing the professionalism of the ED community, the following actions may be appropriate for the URL subspecialty community:

- a. Development of specific training and education criteria for selection of URL subspecialists in ships and combat systems engineering fields.
- b. Encouragement of URL officers to become technical subspecialists.
- c. Assignment of high quality URL subspecialists to duty in technical positions in support of the design, acquisition and maintenance of ships and combat systems.

C. The Role of the ED at Sea

1. EDs are professional naval officers and should serve at sea, preferably in a combatant ship, and preferably early in their naval careers.
2. One hundred forty-one (10%) of the ED billets are in ships' allowances; included are 38 engineer officer billets. These engineer officer billets are not essential to the ED role and reduce the number of engineer officer billets available for URL officers.
3. The following guidance should apply to assignment of ED officers at sea:
  - a. Sufficient sea billets should be designated to provide basic sea experience for direct accession EDs.
  - b. The repair officer billet on all tenders (AD, AS, AR) should be designated as an ED billet.
  - c. Sufficient main propulsion assistant billets in aircraft carriers should be designated as ED billets to ensure that qualified EDs are available for assignment to Naval Air Force type commander staff duty and other key carrier maintenance billets.

D. The Role of the ED in Navy and DOD-wide Command and Control, Large Area Surveillance and Telecommunications.

1. The Study Directive directed an examination of the role of the ED in Navy and DOD-wide command and control, large area surveillance and telecommunications within the electronics specialty. The examination was limited because of the broad nature of this total area of interest, the large participation by officers of all services and several specialties, and the lack of adequate statistics readily available for meaningful interpretation.

2. Statistics are available to show that of the 259 ED officers designated as electronics specialists, about one fifth (46) are involved to a significant degree in Navy and DOD-wide command and control, large area surveillance and telecommunications. Included in these are nine ED officers serving in billets outside the Navy. The extent of URL subspecialist participation in this field could not be determined from available data. The group concluded that this area required more analysis than could be made during the study to answer properly the question in the Study Directive. The participation of ED electronics specialists in Navy and DOD-wide command and control, large area surveillance and telecommunication systems design and acquisition is important. The extent of their involvement should be resolved by a study specifically directed to this issue.

E. The Role of the ED in Weapons

1. The Study Directive directed an examination of the ED role in Navy shipboard weapons systems. Design and acquisition of these systems are dominated numerically by civilians. Of the 12 officers at NAVSEC involved in combat systems design, 11 (92%) are EDs. Of the 83 officers at NAVSEA Headquarters involved in combat systems acquisition, 32 (39%) are EDs. Of the 46 URL officers engaged in combat systems acquisition within NAVSEA Headquarters, 27 (59%) are proven subspecialists and 5 (11%) are subspecialists.

2. There are 551 URL officers and 139 EDs with graduate level education in weapons systems engineering. Currently there are 114 billets designated for EDs and 193 shore billets designated for URL subspecialists. Between 1955 and 1971, 40 of the 77 officers who became EDs did so after completing ten years of URL service. Three of the current 28 ED captains with a weapons specialty have spent their entire careers as EDs. The remaining 25 transferred to the restricted line after an average of 13.6 years of active duty.

3. A combination of recent operational experience and technical competence is particularly useful in the design, acquisition, and maintenance of ship combat systems. The URL subspecialist, who combines at sea experience with a technical subspecialty, provides this balance and the ED weapons specialist provides the in-depth technical knowledge required.

4. Rapid technological change in combat systems requires long term involvement in the technical direction of design, acquisition and maintenance of these systems. This intensifies the need for earlier accession of officers into the ED weapons specialty. Similarly, this rapid technological change heightens the importance of the contribution the URL weapons systems engineering subspecialist can make in bringing up-to-date operational experience to the development of combat systems. This requires assignment of high quality URL subspecialists to duty directly involved with their technical subspecialty. The contribution of both ED and URL officers can be improved by longer tour lengths in technical billets directly related to combat systems and continuity of assignments within this technical field.

**F. The Role of the ED in Research and Development**

1. Navy R&D programs are required and established in order to develop and apply new technology to the design of ships and combat systems to satisfy operational requirements. The Navy must acquire and maintain the capability to recognize and apply sound technological advances to current and future Navy requirements. Of equal importance is the capability to recognize and avoid overly ambitious designs which result in development delays, cost overruns and poor availability in the fleet. Involvement on the part of naval officers, who possess an in-depth technical education and background along with an awareness of operational requirements, is required if the Navy is to effectively maintain the above capabilities.

2. Current practices with regard to assignment of EDs to ship and weapons laboratories, and other R&D related organizations, strike a reasonable balance among the needs of the laboratories for ED technical expertise and the Navy's needs for the ED's practical viewpoint and experience regarding ships and combat systems.

#### G. The Role of the ED in Design

1. The design, construction, maintenance and effective operation of ships require technical proficiency. Design requires a particularly high order of expertise and experience. The Navy's responsibility to produce ships and combat systems which work reliably and effectively at optimum cost demands that the Navy exercise technical direction over ship design. The ED must participate actively in the details of the design process to develop technical competency and gain experience necessary to design effective naval ships efficiently and economically.

2. The contribution of EDs in the ship design process has varied widely since World War II. At that time BUSHIPS designed Navy ships; in the early 1960s, the direct participation of BUSHIPS and EDs in ship design declined. Concurrently, the assignment and utilization of junior EDs in the design process declined.

3. Starting in the early 1970s some design functions were reinstituted within the Navy; however, junior ED billets were not reestablished in headquarters or in the field. Such billets should be reestablished and filled in order to provide EDs with working details of the design process. Such knowledge is essential to increasing proficiency in more senior ED design assignments.

#### H. The Role of the ED in Acquisition

1. Acquisition managers whether from the unrestricted or the restricted line should have the following experience:

a. Top performance in an applicable professional field.

b. Familiarity with fleet operational requirements in an associated warfare area.

c. An advanced degree in a scientific or engineering field.

d. At least one previous acquisition or acquisition related tour to provide familiarity with:

(1) Budgetary process

(2) Financial management practices

(3) Contracting procedures

(4) Documentation and procedures required by OSD and the Navy in the acquisition process.

2. Effective acquisition requires a continuity of management beyond that of other Navy assignments. Normally changes should be made only at major program transition points. The Study Group concluded that EDs have career patterns which are in consonance with the general requirements for an acquisition manager. However, considering the wide range of equipment, systems, and tasks addressed by the term acquisition, it is evident that selection of an acquisition manager should be made on the basis of best qualified.

## I. Role of the ED in Fleet Maintenance

1. There are more EDs involved in fleet maintenance than in any other major ED career area. EDs plan and execute maintenance in billets throughout the Navy organizational structure.

2. From the viewpoint of the Navy organizational structure, the role of EDs in maintenance involves the following:

Ship	Responsible for maintenance as required by duty assignment.
TYCOM	Planning and budgeting for overhauls and emergent repairs. Responsible for engineering readiness and involvement in all technical aspects of engineering.
Fleet	Same as TYCOM, fleet-wide.
OPNAV	Same as Fleet, Navy-wide.
NAVSEA and NAVELEX Headquarters	Planning technical aspects of maintenance, including design, acquisition, and logistic support.

3. With regard to the three levels at which fleet maintenance is performed, the ED role is:

Depot

Industrial Facility (NSY, SRF, NOS, etc.)	Command and direction of ship repair and maintenance.
Supervisors of Ship-building, Conversion and Repair	Command and administration of contracts awarded to private industry.
Intermediate (Tenders (AS, AR, AD); Shore-based IMAs)	Planning and direction of maintenance.
Organizational (Ships)	Responsibility for maintenance associated with billet to which assigned.

4. Few changes are necessary to the maintenance oriented ED billets other than those associated with the reduction in ED sea billets.

J. The Role of the ED in Financial Management and Contracting

1. The Study Directive directed an examination of the scope of ED participation in the areas of financial management and contracting.

2. EDs should have sufficient capability in financial management and contracting to carry out their assigned responsibilities; however, career specialization in these areas is properly assigned to the URL and staff corps.

K. The Role of the ED in Explosive Ordnance Disposal

1. Although the Study Directive did not address the area of Explosive Ordnance Disposal (EOD), the Study Group determined that the retention of officers in this special career field within the ED community required examination.

2. EOD officers were merged with the ordnance engineering community in 1971. The majority of the present EOD officers do not have an engineering background and have reduced potential for advanced technical education. Management of this small community (154 officers, of whom 44 are EDs) is a separate effort from the main portion of the ED community because of its special mission and dissimilarity.

3. Other recent studies have identified the EOD specialty as a defined career field assigned to the ED community. The Study Group concluded that the EOD career field is not consistent with the general ED role of providing highly trained professional naval engineers.

SECTION IV  
ED COMMUNITY STRUCTURE

A. General

The size and structure of the ED community depends on requirements for ED billets as expressed by manpower claimants in many communities and organizations in accordance with their interpretation of the ED role. As described in Section II current ED billet requirements result in a community which is not pyramidal in rank structure. Onboard officer structure is dynamic, controlled by the unique variables of promotion and attrition which exist in each rank. A statutory constraint on the size of the ED community exists in that, of the actual number of officers on the active list in the line, not more than 5.5 % may be designated for engineering duty (10 USC 5406), limiting the ED community to about 1800 officers. Pending legislation may change this statutory constraint. The existing community, 1259 officers, represents 3.8% of the active list of the line.

B. Detailed Key Position Review

1. To establish a working community structure, the Group conducted a key position review to identify where EDs were required based on a detailed technical review of the job, individual training, and experience. For convenience these positions were separated into four categories: weapons, electronics, ships and "satellite." "Satellite" included all positions not clearly included in the first three, yet important in the design, acquisition and maintenance of ships.

2. The following screening criteria were used in this review:

The billet should be ED if:

a. Performance at a high level of professional excellence requires a combination of technical education, training, and continuity of experience not normally acquired by an unrestricted line officer, or

b. It provides experience and training that are prerequisite to competent performance in a higher level ED billet.

3. Each key position was analyzed to determine:

a. Whether the position was needed.

b. The required grade.

c. The individual best qualified to perform the assignment (ED, URL, Staff Corps, civilian).

d. Education and training needed.

e. Experience needed.

The key position review resulted in a Group decision that 178 ED captain billets should be designated as "key." Details of this effort to designate key billets and the billet list are contained in Appendix B. A list of billets recommended for change to a designation other than ED is also included in the Appendix. Key ED captain billets were reasonably well identified; however, the complexity of the career field, the short time available and the need for a similar careful evaluation of other ED billets may require adjustment of this list leading to an accurate list of key billets in all grades.

C. ED Community Structure

1. The current ED billet structure was evaluated by computer simulation using the OPNAV Grade Structure Model and the BUPERS Officer Management Simulation Model, assuming present promotion opportunities, attrition factors, and accession plans. The results indicated that the present ED community is unstable because the five to ten year officer inventory projection will not support manning present billets.

2. In a similar manner a series of constructive ED billet structures based on key billets was evaluated by computer simulation. The results of these efforts are contained in Appendix C. These constructive communities were evaluated using various promotion opportunities, attrition factors and accession plans. Results of this effort to determine a workable billet structure are shown in Table IV-1. Inventory projection #1 in Table IV-1 points out clearly the effect of a policy of all direct accessions. An all direct accession plan for the ED community with 180 captains requires over 7000 officers for stability. Toward the other end of the spectrum, accession plans with more line transfers and fewer direct accessions result in smaller communities and require fewer annual accessions.

3. Although time did not permit a complete examination, enough was done to indicate it is possible to establish an optimum billet structure which can be supported by a carefully supervised accession plan. Additional effort is required to identify with precision the optimum ED billet structure by size, grade, and officer source inputs.

# ENGINEERING DUTY OFFICER INVENTORY PROJECTION

TABLE IV-1

AUTHOR-IZED BILLETS	TENTATIVE RESTRU-C-TURED COM-MUNITY		INVENTORY PROJECTION		INVENTORY PROJECTION		INVENTORY PROJECTION		INVENTORY PROJECTION	
	#1	#2	#3	#4	#5	#6	#7	#8		
CAPT	208	180	190	159	179	182	179	184		
CDR	403	360	572	545	458	504	436	378	354	398
LCDR	471	517	1156	677	548	557	510	412	506	
LT	213	213	1920	268	202	217	213	210	234	
LTJG	62	64	1651	77	65	65	0	34	65	
ENS	32	32	2246	32	32	32	0	32	32	
<b>TOTAL</b>	<b>1389</b>	<b>1366</b>	<b>7725</b>	<b>1789</b>	<b>1464</b>	<b>1554</b>	<b>1489</b>	<b>1283</b>	<b>1221</b>	<b>1419</b>

ACCESSIONS \*

(1) DIRECT	N/A	1123	16	16	16	0	16	16
(2) LINE TRANSFER	N/A	NONE	176	144	155	143	126	104

PROMOTION OPPORTUNITY

CAPT-CDR-LCDR	N/A	60-70-80	60-70-80	60-70-80	70-70-80	80-70-80	85-85-80	80-80-80
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\* DIRECT ACCESSIONS - 50% OCS, 50% NROTC (SCHOLARSHIP)

LINE TRANSFER - APPROXIMATELY 1/3 EACH WITH USNA, OCS  
AND NROTC (SCHOLARSHIP) SOURCE  
- MIX OF CDR, LCDR, LT, LTJG

SECTION V  
ED COMMUNITY DEVELOPMENT

A. Recruitment

1. Accession quotas for the ED community have not been met during the past several years. The quotas were approximately 150 accessions per year including 30-40 direct accessions and 110-120 line transfers. Analysis of Table V-1 and Figure V-1 reveals:

a. Actual accessions averaged approximately 60% of quotas over the past five years.

b. There has been a reduction in accessions and, in general, this reduction was caused by decreasing direct accessions.

c. The largest source of direct accessions has been OCS.

2. Factors which have impacted direct accessions are:

a. USNA. Present CHNAVPERs policy (CHNAVPERs ltr of 17 Dec 1974) does not permit direct accession of physically qualified USNA graduates into the ED community.

b. NROTC. Present CHNAVPERs policy (CHNAVPERs ltr ser 211/382 of 7 Aug 1976) does not permit direct accession of physically qualified NROTC midshipmen into the ED community except from MIT.

## HISTORICAL ED ACCESSIONS VS QUOTAS

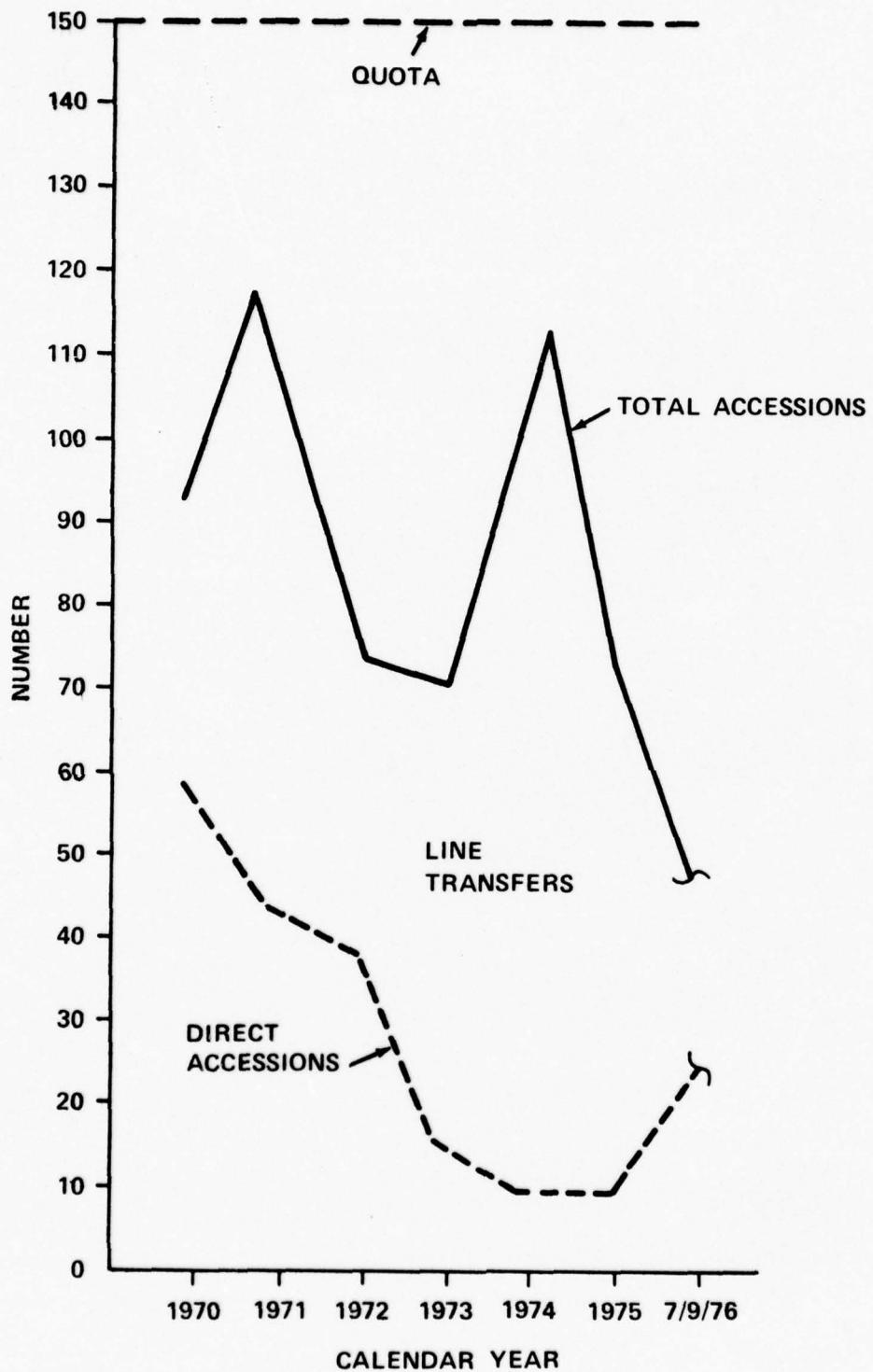


Figure V-1

V-2

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### **3. Line Transfer.**

a. The principal source of accessions to the ED community has been line transfers. Figure V-2 shows that line transfer selections reached a low point in 1972 and that the number of applicants for line transfer to ED has dropped precipitously. Of these applicants, the percentage selected for ED has increased from about thirty percent in 1968-70 to about fifty percent in 1974-75. This evident decline in selectivity, together with other indicators such as the decline in USNA class standings discussed in Section II, suggests that overall quality of officers who transfer has been declining in recent years.

b. Tables II-6 and II-7, as discussed in Section II, show that a large number of recent line transferees have been NESEP officers. These officers have more time in service than their ED year group contemporaries and thus reach retirement eligibility at a lower rank.

c. Current BUPERS policy permits a maximum of four nuclear trained officers (surface and submarine) and ten submarine navigation or weapons trained officers to transfer to the restricted line each year. This policy is considered reasonable in view of the Navy's needs for retaining highly trained officers in the submarine force and in nuclear ships.

### **4. Actions to Improve Quality and Quantity of Accessions.**

a. The billet modeling effort described in Section IV and Appendix C demonstrated that the key to a relatively small, highly focused ED community, is an effective line transfer process. The extreme alternative, an ED community supported entirely by direct accessions, numbers over 7000 officers and is unrealistic in today's environment. The opposite alternative, a community supported entirely by the line transfer process, is equally unrealistic due to the needs of the URL communities for top performing, technically proficient officers. Thus reality dictates a mixture of direct accessions and line transfers as the likely future support of the ED community. Based on the key billets identified herein, together with the modeling effort of Section IV, a total of about 140-160 officers per year is identified as the required accession rate.

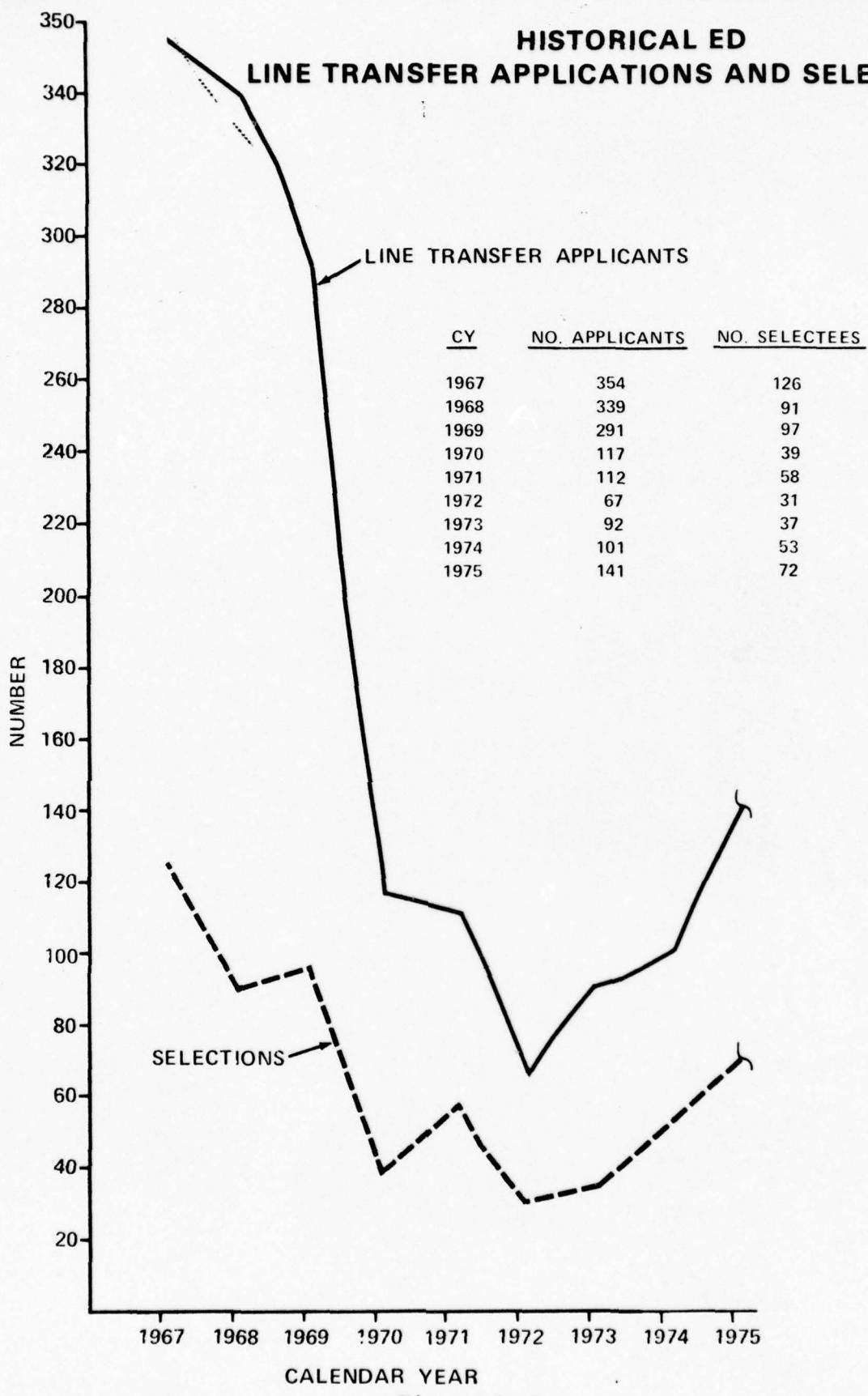


Figure V-2  
V-4

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b. For FY-77, the following recruiting goals are recommended:

<u>Source</u>	<u>Quota</u>
Line Transfer	110-120
USNA	5
NROTC	10
OCS	20

As described in Section IV, additional effort will be required to refine the accession plan after the optimum ED structure is identified.

c. It is in the Navy's interest to maintain an ED community that is no larger than necessary to meet requirements. A vigorous line transfer program of high quality officers will help meet these requirements and minimize the size of the ED community. Criteria for selection of direct accession ensigns and of line transfer applicants do not now exist and should be developed. Such criteria, once established, should be used consistently and deviated from only after careful deliberation.

d. Achieving the goals discussed above will require a fresh approach to the ED recruiting program, including a change in existing policies and procedures for direct accession as well as an aggressive recruiting effort throughout the Navy.

**B. Qualifications**

1. Two formal qualification programs apply to EDs:

a. Engineering Duty Officer Basic Qualification Program (EDQP), NAVSEA INST 5450.29/NAVELEX INST 5450.31 of 2 April 1976, and

b. Engineering Duty Officer Designation: Qualified in Submarines (ED Dolphin Program), BUPERS Manual 15791B, Article 1410300.

2. Basic qualification is achieved through the EDQP shown in Figure V-3 and may be completed in a two year period. The EDQP was implemented in April 1976 and is a mandatory requirement for all EDs designated after January 1976. There are presently 152 candidates in the program and the program is scheduled to undergo formal evaluation in April 1977. The EDQP is sound in concept and should be continued and supported. Specific standards for measuring the qualifications of the graduates of this program should be developed and applied.

3. Table V-2 indicates that over fifty percent of the submarine qualified EDs will be eligible for retirement within the next three years. The ED Dolphin program was initiated to provide more EDs with submarine knowledge. This program is outlined in Figure V-4. It is well designed but needs more participants. There are presently 17 candidates in the program. It is estimated that between 250 and 300 submarine qualified EDs are required to meet the Navy's needs. The number of officers expected to complete the ED Dolphin program, even supplemented by the line transfer of submarine qualified officers, is insufficient to satisfy the requirements for submarine qualified EDs. A vigorous effort is required to train and qualify many more officers in ED submarine work.

## ENGINEERING DUTY OFFICER BASIC QUALIFICATION PROGRAM

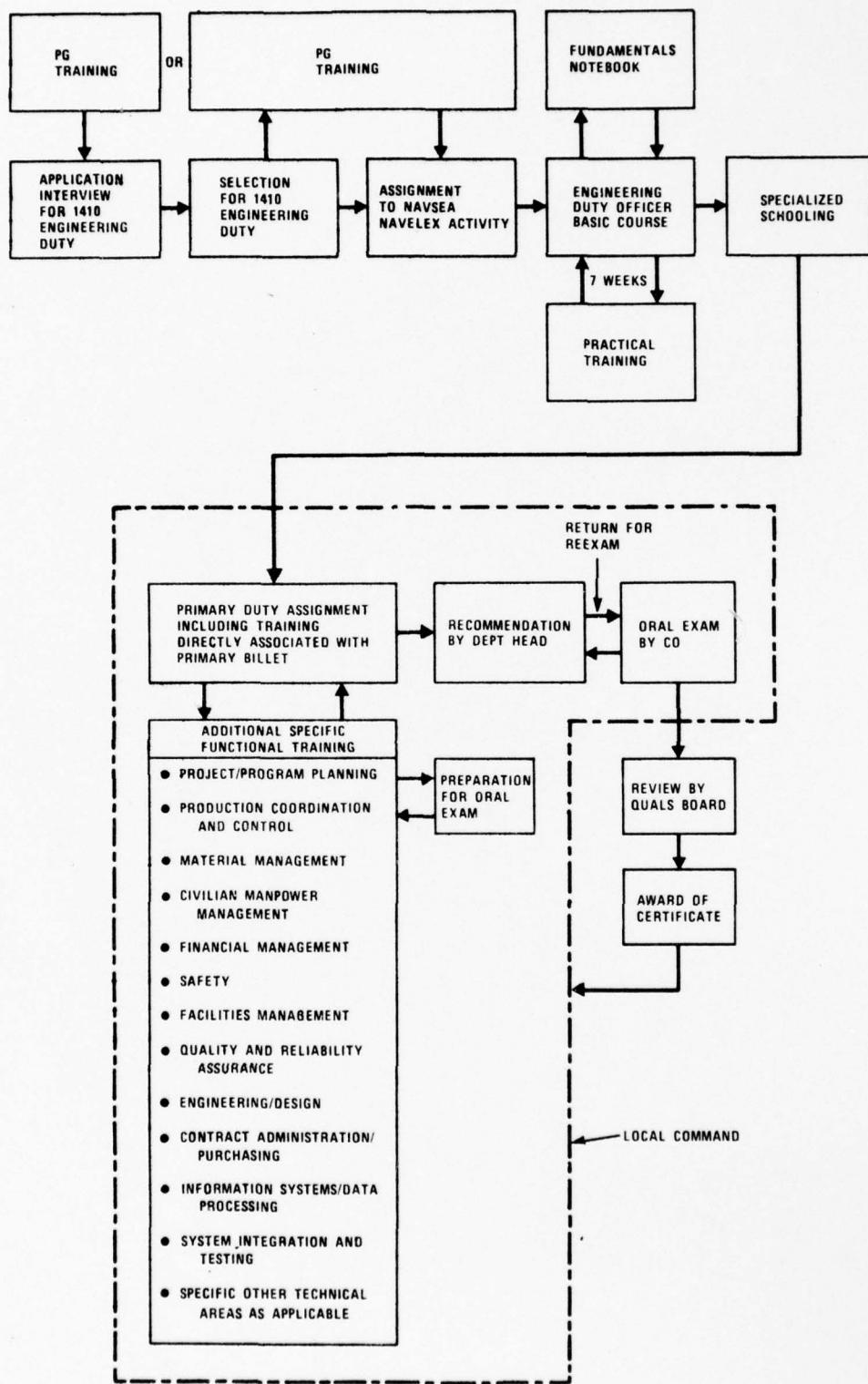


Figure V-3

## ENGINEERING DUTY OFFICER DOLPHIN PROGRAM

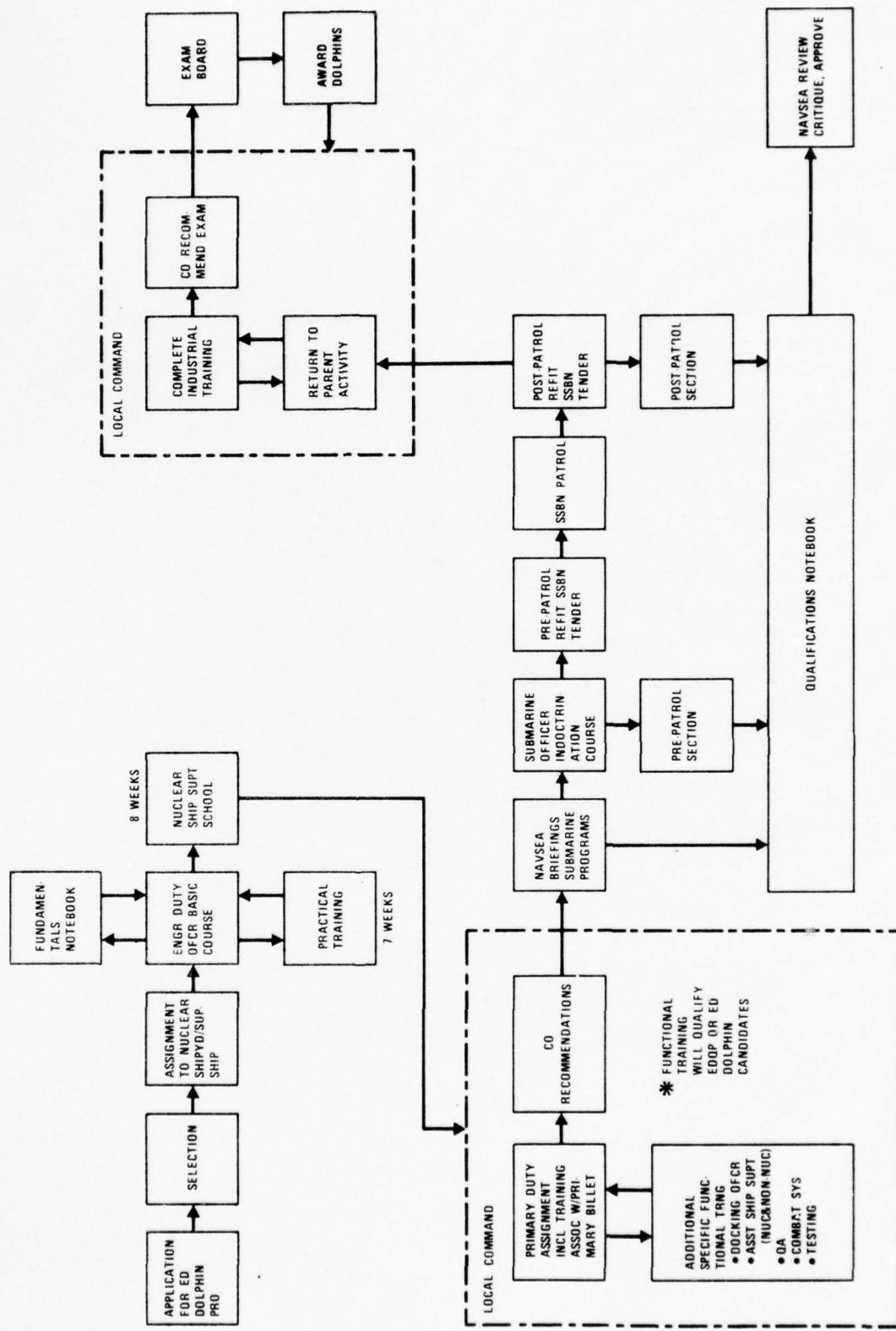


Figure V-4

C. Career Development

1. Education.

a. Postgraduate education for EDs is normally by either:

(1) Naval Postgraduate School, Monterey (NPS). This is generally a two year effort leading to a Master's degree in an engineering or associated technical area. In certain cases, training is extended at this or another university to permit the candidate to complete the necessary program leading to a Doctorate.

(2) Massachusetts Institute of Technology (MIT). This program is a three year effort leading to either a dual Master's (engineering and management) or to an Engineer's degree.

b. A single technical Master's degree is sufficient, in most instances, for proper accomplishment of ED duties. The following changes are recommended:

(1) Restructure the MIT program to a two year program providing a technical Master's degree; and provide a special course lasting one additional year for exceptional students to permit concentrated study in the application of their technical specialty to the design of ships and combat systems.

(2) Permit graduate education at the Doctorate level only in exceptional cases and then only after approval by the designator advisors.

## 2. Career Patterns.

a. Previous experience is a major factor in qualifying for specific billets. Table V-3 indicates the experience patterns desired for key ED billets. These patterns are the results of analysis of the key billets. A comparison of present experience profiles, Table II-10, with desired experience profiles, Table V-3, is as follows:

	Current Profile (%)	Desired Profile (%)
Maintenance & Logistics	39	38
Acquisition	14	28
Design	6	15

b. It is evident that additional emphasis is required in planning, monitoring and reviewing ED assignment practices. BUPERS, NAVSEA and NAVELEX offices responsible for these actions should be strengthened to provide the necessary capability for long range planning. Specifically, such an effort should increase officer technical competence and should:

(1) Increase each officer's experience in a given career path.

(2) Increase ED technical involvement in design and engineering.

(3) Control officer rotation to ensure continuity of experience and technical responsibility.

c. The CNO has recently requested a review of the impact of new ship construction in naval shipyards on the ED community. A decision to construct ships in naval shipyards would require a detailed reevaluation of billets and personnel. Of particular significance would be the need to increase billets in SUPSHIPS and shipyards to provide a means for intensified training of shipbuilding qualified EDs.

D. Existing Efforts.

The current condition of the ED community indicates a need for continued support and improvement of various recent ED personnel initiatives. These initiatives, beginning in 1973, resulted from efforts to establish a program to increase the technical competence of the ED community. Among these initiatives are:

1. Establishment of the ED Qualification Program.
2. Establishment of the ED Basic School.
3. Increased recruiting effort in field activities to obtain more officers.
4. Establishment of a school for senior shipyard managers.
5. Development of an interview program for ED candidates.
6. Reviews of junior officer education and training curricula.

**TABLE V-1**  
**HISTORICAL ED DIRECT**  
**AND LINE**  
**TRANSFER ACCESSIONS**

YEAR	DIRECT ACCESSIONS					LINE TRANSFER ACCESSIONS	TOTAL ACCESSIONS
	OCS *	USNA	NROTC	OTHER	TOTAL		
1970	39 (40)	0	11	9	59	33	92
1971	35 (40)	0	6	3	44	74	118
1972	34 (35)	0	3	2	39	36	75
1973	9 (11)	0	6	1	16	54	70
1974	6 (7)	1	3	0	10	103	113
1975	6 (8)	0	4	0	10	61	71
1976 **	18 (22)	0	5	3	26	15	41

\* NOS IN PARENTHESES ARE ANNUAL QUOTAS

\*\* AS OF 7/9/76

TABLE V-2  
**"SUBMARINE" QUALIFIED EDs**

YEAR GROUP	SUBMARINE QUALIFIED	SUBMARINE QUALIFIED (ENLISTED)	ED DOLPHIN QUALIFIED	TOTAL SUBMARINE QUALIFIED	ED DOLPHIN CANDIDATES
47-54	49		1	50	
55-59	102		6	108	1
60-64	52	3	3	58	6
65-69	32	16	1	49	8
70	1	2	2	5	1
71	2	0		2	1
72		1		1	
73-76					
TOTAL	238	22	13	273	17

SOURCE: DIRECTORY OF ENGINEERING DUTY OFFICERS DATED OCTOBER 1975

TABLE V-3

**DESIRED PERCENTAGE OF EXPERIENCE EMPHASIS  
FOR KEY BILLET CATEGORIES**

KEY BILLET CATEGORIES	EXPERIENCE EMPHASIS NOTE (1)								# KEY BILLETS
	RESEARCH & DEVELOPMENT	DESIGN	ACQUISITION	Maintenance & LOGISTICS (FLEET SUPPORT)	SHIPBOARD	PROJECT MANAGER OR COMMAND			
NAVAIR PROJECT MANAGER (1) SHIP ACQUISITION (2) COMB. SYS. ACQUISITION	5 10	15 20	45 40	30 20	0 10	5 0	14 7		
NAVAIR OTHER	10	20	30	30	10	0	0	25	
SHIPID/SRF (1) CO (2) DEPARTMENT HEAD	0 0	10 10	20 10	50 60	20 20	0 0	11 26		
SUPSHIPS	0	20	40	30	5	5	0	15	
NAVELEX (1) PROJECT MANAGER (2) OTHER (3) FIELD	20 15 15	10 10 5	40 30 30	20 25 40	10 15 10	0 5 0	5 6 5		
NAVSEC	5	25	30	30	5	5	0	8	
ORDNANCE FACILITIES	20	15	30	35	0	0	0	7	
STRATEGIC OFFICES	20	15	35	25	5	0	0	6	
FLEET STAFFS	5	5	10	65	15	0	0	11	
LABS	25	15	30	15	10	5	0	6	
NAVPLTREP	10	20	50	10	10	0	0	3	
INSURV	0	20	10	50	20	0	0	4	
AVERAGE CAPT	7	15	28	38	11	1	159		NOTE 3

- NOTE (1) EXPERIENCE REPRESENTS THE 15 TO 18 YEAR PERIOD FOLLOWING THE FIRST NINE YEARS OF BASIC EXPERIENCE.
- (2) MAINTENANCE AND LOGISTICS INCLUDES FLEET STAFF MATERIAL TOURS AND TENDER REPAIR OFFICER TOURS.
- (3) 19 "OTHER" KEY BILLETS WERE NOT INCLUDED IN THESE EXPERIENCE CATEGORIES

## SECTION VI

### CONCLUSIONS AND RECOMMENDATIONS

#### A. Conclusions

1. The Navy needs an ED community of highly trained, experienced, professional naval engineers to technically direct the design, acquisition and maintenance of ships and combat systems.

2. There is need for an official document delineating the role of the ED.

3. The role of EDs in the Navy is to perform effectively:

first - as naval officers,  
second - as a community of professional engineers specializing in ships and combat systems and,  
third - stemming from both the above, as individuals accepting responsibility for technical matters in all assignments.

4. EDs should provide increased technical leadership and direction of design, acquisition and maintenance of ship combat systems.

5. EDs should contribute to technical leadership and direction of Navy and DOD command and control, large area surveillance, and telecommunications systems. The degree of this involvement could not be determined.

6. EDs should have sufficient capability in financial management and contracting to carry out their assigned responsibilities; however, career specialization in these areas is properly assigned to the URL and staff corps.

7. There is a need for URL subspecialists in the design, acquisition and maintenance of ships and combat systems, to provide operational experience and that degree of direct technical contribution appropriate to their subspecialty.

8. Many of the current ED billets at sea should be redesignated for URL officers to make more engineering experience available to them. ED billets should be limited to those required for:

- a. Basic sea experience
- b. Tender (AD/AS/AR) repair officers
- c. Some carrier main propulsion assistants

9. Some ED captain billets do not match the role and responsibilities of the ED community. The subordinate billet structure, while not studied in detail, may also be incorrect.

10. The present inventory and input of EDs do not meet the requirements of the current billet structure.

11. Accessions to the ED community are inadequate:

- a. Input has averaged about 60% of requirements over the past five years.
- b. Direct accession of physically qualified USNA graduates is prohibited.
- c. Direct accession of physically qualified NROTC midshipmen is limited to the MIT unit.
- d. The number of applications for line transfer to ED has declined.
- e. The average academic standing of USNA graduates who have become EDs has declined.

12. The years of reduced selectivity and declining USNA academic standing inevitably result in some number of EDs who do not possess the capability and potential to achieve the high standards of professionalism to which the ED community must aspire.

- a. There is no overall Navy effort to motivate highly qualified officers to seek ED careers.
- b. Enhancement of the professional image of the ED community is essential to attracting high quality applicants, and will require vigorous and visible action by the leadership of the ED community and by the URL as well.

13. The recently established Engineering Duty Officer Basic Qualification Program is sound in concept and should be continued and supported.

14. In general, a Master's degree in a single engineering discipline is sufficient academic preparation for an ED career.

15. Existing curricula at MIT and NPS that support the ED community should be reviewed for content and focus, considering the following:

a. The dual Master's program is not needed as part of an ED's basic education.

b. A technical Master's degree as a benchmark education level for EDs suggests that two years may be an adequate postgraduate period in most cases.

16. The Explosive Ordnance Disposal specialty does not fit the role of the EDs.

17. BUPERS, NAVSEA and NAVELEX offices responsible for reviewing and monitoring the planning, supervision and execution of ED personnel policies are so burdened with everyday business that adequate effort has not been directed toward community review and planning.

B. Recommendations

1. Promulgate the role and responsibilities of the ED community.

2. Review and revise the ED billet structure as follows:

a. The billet should be ED if:

- (1) Performance at a high level of professional excellence requires a combination of technical education, training, and continuity of experience not normally acquired by an unrestricted line officer, or
- (2) It provides experience and training that are prerequisite to competent performance in a higher level ED billet.

b. ED sea billets should be reduced to those required for:

- (1) Basic sea experience
- (2) Tender (AD/AS/AR) repair officers
- (3) Some carrier main propulsion assistants

c. The revised structure should ensure that requisite billets are available to provide experience for key billets, including more direct involvement in design and shipbuilding.

d. The billet structure should be supportable by realistic accession and promotion plans.

3. Establish professional and academic standards for accessions to the ED community.

4. Develop and implement a vigorous program for recruitment and accession of officers to support the required community.

5. Conduct a systematic screening of the current ED community to determine the ability and potential of the existing officers to perform to high standards of technical proficiency and professional responsibility. The results of the screening are to be the basis for determining those officers: (a) who have verified ability and potential, (b) who can achieve requisite performance with a reasonable degree of training and guidance, or (c) for whom a change in designator to other than 1410 would be appropriate.

6. Develop specific training and education criteria for selection of URL proven subspecialists in the technical fields.

7. Encourage and assign high quality URL subspecialists to duty in technical positions in support of the design, acquisition and maintenance of ships and combat systems.

8. Assign EDs in accordance with a detailing plan designed to increase ED technical competence.

a. Increase each officer's experience in a given career path.

b. Increase technical involvement in design and engineering.

c. Control officer rotation to ensure continuity of experience and technical responsibility.

9. Subspecialty consultants for Naval Systems Engineering and Weapons Systems Engineering review this report in preparing for the next review of MIT and NPS curricula, and address the conclusions and recommendations herein when developing recommended action.

10. Assign EOD officers a designator other than 1410.

11. Determine the extent to which ED electronics specialists should be involved in Navy and DOD-wide command and control, large area surveillance and telecommunications.

12. COMNAVSEA and COMNAVELEX develop the capability within their organizations to pursue implementation of this report and to effect long range planning for and continuing review of the ED community.

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DEPARTMENT OF THE NAVY  
OFFICE OF THE CHIEF OF NAVAL OPERATIONS  
WASHINGTON, D.C. 20350

IN REPLY REFER TO

Ser 00/500856  
12 July 1976

From: Chief of Naval Operations  
To: Distribution List

Subj: Study Directive for Staff Study of Engineering Duty Officer (1410) Community

Encl: (1) Study Membership  
(2) Staffing Requirements

1. Title: Staff Study for Engineering Duty Officers (1410).

2. Type: CNO Study.

3. Background: There is a need to improve the Navy's capabilities regarding the design, acquisition and maintenance of ships and shipboard systems.

Within the Navy, the community of Ship Engineering Duty Officers (1410) has long been associated with these matters in both technical and managerial positions.

Over the years the range and complexity of these professional areas have increased, and some of the responsibilities and authorities have become fragmented. These considerations, coupled with the merger of Ship Engineering (1400) and Ordnance Engineering (1700) into a single Engineering Duty (1410) community justify a comprehensive review of the fundamental requirements for 1410's and a clear determination of the role of those Engineering Duty Officers in the Navy.

4. Objective: The objective of the study is to determine the Navy's requirements for Engineering Duty Officers (1410) and the actions to satisfy those requirements. Specifically, the study will include the requisite quantitative and qualitative composition of the community, the responsibilities to be assigned to 1410's as delineated from those assigned to other Restricted Line, Staff Corps and the Unrestricted Line, and the major elements of a plan to transition from the current situation to one adequate to satisfy requirements. Finally, the study will identify issues and problem areas needing more detailed long term analysis.

5. Specific Guidance: Areas of examination to include, but not be limited to:

a. Review all existing studies, analyses and other

information relevant to the issues.

b. Structure of the community. Examine all present technical sub-elements as to their necessity to the mission.

c. Billets. Examine present billets for proper mix. Determine whether certain billets should be assigned to other communities or vice versa. Determine the proper number of ED billets for a well structured community.

d. Electronics Subspecialty. Examine role of ED in Navy and DOD-wide command/control, large area surveillance and telecommunications - only marginal involvement now.

e. Weapons Subspecialty. Examine role of ED in Navy shipboard weapons systems - only marginal involvement now.

f. Financial Management. Examine scope of ED participation in this area. Supply Corps has done much of this recently. Unrestricted Line is being given an increasing role.

g. Contracting. Examine scope of ED participation in this area.

h. Relationship with Unrestricted Line. In all of the above, the Unrestricted Line role (subspecialists and WSAM designated) should be clearly identified vis-as-vis that of the ED.

i. Recruitment. Examine areas of recruitment of ED's. Determine the number of direct accessions from USNA, NROTC, and from civilian engineering schools via OCS. Determine number and entry point of line transferees into the ED Community.

j. Qualification. Examine present programs for education and training of ED's. Consider whether additional shipbuilding experience should be provided to ED's as part of their qualification. Determine the amount of direct design experience required.

k. Career development. Define ED career development, from cradle to grave, including: source colleges and baccalaureate credentials; content of post-graduate education; assignments afloat and ashore; special schooling; qualifications for top ED command and management roles; and all other aspects of

professional development which will more clearly define the ED profession. This may take the form of a CNO directive to the Navy so as to eliminate any confusion as to the proper professional role of the ED in the shipbuilding, design, and repair business relative to all other communities who must also be involved.

6. Participants and Review:

- a. The study will report to a steering committee chaired by the VCNO. Other committee members are the CNM, Ops 01, 02, 03, 04, 05, 090, 094, COMNAVSEA and COMNAVELEX.
- b. The study director will be RADM C.R. BRYAN.
- c. Members of the study group will be provided IAW Enclosure (1) and will devote full time as necessary to comply with this directive.
- d. Staff support members will be provided IAW Enclosure (2).
- e. If the study director determines that added support is required, he will draw on CNP, CNM, COMNAVSEA and OP-96.
- f. The study group will convene at 0900 19 July 1976 in Room No. 812, Commonwealth Building, Rosslyn, Virginia.

7. Reporting:

- a. Meetings of the steering committee shall be called by the chairman after development of the conceptual study plan, at termination of the study, and at other times considered appropriate by the chairman and the study director.
- b. A report of the study will be submitted to the Chief of Naval Operations by 27 August 1976.

*J L Holloway III*  
J. L. HOLLOWAY III  
Admiral, U.S. Navy

Distribution:  
(See page 4)

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STUDY GROUP MEMBERS

Study Director	RADM C.R. BRYAN (1410)	Director, Ships Maintenance and Modernization Division (OP-43)
	RADM W.C. BARNES (1410)	Commander, Naval Ship Engineering Center
	RADM E.B. FOWLER, JR. (1410)	Vice Commander, Naval Electronics Systems Command
	RADM D.P. HALL (1120)	Deputy Commander for Fleet Support, Naval Sea Systems Command
	RADM L. BAGGETT, JR. (1110)	Commander, ASW Systems Office (PM 4)
	CAPT J.D. BEECHER (1410)	Director, Surface Warfare Systems (SEA 06G), Naval Sea Systems Command (Prospective PMS 399 (FFG))
	MR. P.M. PALERMO (GS-16)	Asst Director, Hull Design Division, Naval Ship Engineering Center
	MR. M.C. HANSEN (GS-16)	Executive Director, Under- sea Warfare Systems Group, Naval Sea Systems Command

SUPPORT STAFF

Staff Director

~~CDR KEEGAN 01~~  
CDR ~~J.J.~~ TURNER (SEA-~~OOV~~)

LCDR P.G. RUFF (PERS-445C)

LCDR W.C. PFISTER (SEA-OOV2)

Stenographic (OP-09B provide)

3 GS-301/5 (with augmentation as workload requires)

Support staff augments as required:

CAPT W.J. MAHONEY (SEA 924) 1410 (Prospective  
PERS-445)

CAPT J.B. WHEELER (ELEX-03) 1410

CAPT J.E. REISINGER (SEA-991) 1410

CDR P.M. RESSLER (PMS-396) 1410

CDR R.H. ROZITSKE (PMS-392) 1410

CAPT J.H. GILCHRIST (SEA-660) 1120

CDR G. HAMILTON (PME-108) 1110

Enclosure (2)

A-6

## APPENDIX B

### KEY CAPTAIN BILLETS

#### A. Introduction

1. To best define the Navy structure which supports the design, acquisition and maintenance of ships and combat systems, the Study Group identified key positions within four categories: ordnance, electronics, ships and "satellite." The first three are self-explanatory; the fourth category was defined as that group of positions clearly not included among ordnance, electronics or ships, yet important in the design, acquisition and maintenance of ships and combat systems. Once the key positions were identified, a sampling technique was used to obtain a broad input as to the qualifications for these positions. This sampling technique consisted of delivering a questionnaire to a number of persons with knowledge of the job qualifications and experience needed for successful performance in each position. The responses were collated by key position, displayed and compared. Key positions with similar requirements were grouped and a Study Group consensus as to qualifications and experience was developed. Development of this consensus profile for each position included input from Study Group members with knowledge of the position. The consensus profiles were translated into career paths which could reasonably be expected to develop officers qualified for the position. At this point a determination was made by the Study Group as to which sector of the Navy (civilian, unrestricted line, restricted line (ED), other restricted line, or staff corps) could best be expected to produce the person capable of performing the duties of that position. In identifying positions as ED billets, the criteria of Section IV.B were used.

#### THE BILLET SHOULD BE ED IF:

PERFORMANCE AT A HIGH LEVEL OF PROFESSIONAL EXCELLENCE REQUIRES A COMBINATION OF TECHNICAL EDUCATION, TRAINING, AND CONTINUITY OF EXPERIENCE NOT NORMALLY ACQUIRED BY AN UNRESTRICTED LINE OFFICER,

or

IT PROVIDES EXPERIENCE AND TRAINING THAT ARE PREREQUISITE TO COMPETENT PERFORMANCE IN A HIGHER LEVEL ED BILLET.

Applying these criteria resulted in the listing of 178 key ED billets shown in Table B-1. Only key captain billets are listed since time limited the review to this level and these billets can effectively structure the remainder of the community.

2. The initial determination of "key positions" was made by the Study Group. First the list of billets presently designated for EDs was critically examined to delete those which do not require the technical expertise which an ED could be expected to possess. The charts of the organizations involved in the research, development, design, acquisition and maintenance of ships and combat systems were examined to tentatively identify billets not now designated for an ED, but which might properly be so designated. The resulting lists were combined, eliminating redundancy, to form the "key position" list. Each of the persons to whom a questionnaire was sent was asked to identify any other positions he considered "key." This request produced no additions, thus increasing the Study Group's confidence in their original list.

3. The following paragraphs discuss the results of the analyses of key positions in the ships, electronics, ordnance and satellite categories. Summary billet lists are presented in these tables:

<u>Table</u>	<u>Title</u>
B-1	Key ED Captain Billets by Activity
B-2	Current ED Captain Billets Recommended for Redesignation, Abolishment, or Downgrading
B-3	Non-ED Key Captain Billets Recommended for Redesignation to ED

#### B. Ships

1. Billets examined by the Study Group in the ships category included 267 ED, URL, Staff Corps and civilian positions. Classification of these billets resulted in a recommendation that sixteen ED captain billets be redesignated for URL, two be redesignated for civilians, and three be abolished. Two URL billets in the ships category were recommended for redesignation to ED. Fourteen ED captain billets were recommended for downgrading to commander rank. These actions resulted in a list of 105 key ED captain billets.

2. In the area of EDs at sea, the repair officer billets for destroyer tenders and repair ships should be upgraded to commander rank to provide the benefits of the additional experience and qualifications that the ED has gained in reaching that point in his career. Additionally, billets in shipboard engineering, beyond basic ED qualification, should be utilized only to provide experience that is necessary for identified key ED billets. These key ED billets are the ship logistics managers, the ship acquisition managers, and the type commander staff billets for the major ship types. The engineering department head tours are not considered necessary to provide this experience; main propulsion assistant tours are considered adequate.

### C. Electronics

1. The number of key captain billets which require an ED with an electronics technical specialty was established as 35. The Study Group reviewed 45 billets of various designators. Recommended actions include redesignating ten billets from ED to URL and fourteen billets from URL to ED. In general the billets redesignated to URL are associated with electronics management positions where electronics experience is not the dominant prerequisite. The billets redesignated to ED are involved with the design and acquisition of electronics systems, or management of Navy laboratories, where technical knowledge and experience are the major prerequisites.

2. The major electronics acquisition projects requiring electronics expertise are listed below. These projects are not expected to change significantly in the foreseeable future:

PME 106 Navy Space Project  
PME 107 REWSON Systems Project  
PME 108 C<sup>3</sup> Systems Project  
PME 117 Special Communications Project  
PME 124 Undersea Surveillance Project

3. Current practice is to assign project managers from the URL since in recent years the best qualified officers have been URL officers. Three of the project management billets are presently designated for the URL, PME 117 is a 1410 billet and PME 106 is a 1500 billet. The ED community should provide qualified EDs to serve as major electronics acquisition project managers.

D. Weapons

1. As a result of the key position survey and analysis by the Study Group, the number of key captain billets which require an ED with an ordnance specialty was increased from 25 to 26. This change resulted from the redesignation to URL of three billets presently designated for an ED, redesignation of three EOD captain billets to another designator, abolishment of one billet, transfer of two ED billets to the Army, downgrading of two ED billets, and the redesignation of twelve URL billets to ED. The billets redesignated from ED are those not supporting the ED role; e.g., explosive ordnance disposal, and those where fleet experience is the dominant requirement. Billets redesignated to ED are those involved with the design and acquisition of weapons systems where technical knowledge and experience predominate.

2. Six project manager billets which are now URL billets are shown as being recommended for redesignation to ED. It is the sense of the Group that the ED community has the responsibility to provide officers qualified to fill project manager billets. In the interim, the selection of these acquisition managers should continue to be made on the basis of best qualified, URL or ED.

3. Further study of the weapons billet structure within NAVSEA headquarters is required. It may be possible to reduce significantly the number of ordnance captain billets, including ED captain billets. This study should be accomplished as a part of the complete review of the ED billet structure recommended in Section VI.

E. Satellite

1. Billets examined in the satellite category generally ranged over the following areas:

MAAGs and Missions  
Education  
Basic Research  
Personnel and Manpower Management  
Staff  
Shorebased Supply  
Foreign Military Sales

2. As a result of the review of billets in these areas, the number of key positions requiring an ED captain was established at twelve. Recommended actions included the redesignation of two URL billets to ED, of four ED billets to URL, upgrading one ED commander billet to captain rank, and downgrading one ED captain billet to commander rank.

3. The satellite area billets are such that normal ED career development will produce qualified officers.

TABLE B-1  
KEY ED CAPTAIN BILLETS BY ACTIVITY

<u>Activity</u>	<u>Position</u>
NAVSEASYSCOM HQ	SEA-00B, Exec Asst/Sr Aide SEA-00C, Supervisor of Salvage SEA-00N, Inspector General SEA-032, Dir Adv Tech Sys Div SEA-034, HD Electro Mag & Acous Div SEA-04B, Asst Dep Cdr Flt Sup SEA-049, Dir Flt Imp Prog Div SEA-06HC, Asst Dir USW Group SEA-6513, Dir Combat Int Div SEA-652, Surveillance Sys Subgp SEA-653, Dir Surf Gun Sys SEA-660C, Sonars Div SEA-661C, Dir Surface Sonar Div SEA-662, Dir Torpedo Subgp SEA-663, Dir Mines/Spec War/EOD SEA-07B, Ast Dep Cmdr Ind & Fac SEA-071, Dir Ind Wk & Resource SEA-073, Dir Ind Act Mgmt Sys Div SEA-074, Dir SUPSHIP Mgmt Div SEA-924, Dir Sub Log Div SEA-934, Dir Cru-Des Log Div SEA-935, Dir Amphib/Aux Ship Log Div SEA-936, Dir CV Log Div SEA-992, Dir Ammo Mgt Div SEA-993, Dir Nuc Weps PMS-300, PM, Comb Craft Acq Proj PMS-303, PM, NATO PHM PMS-304, PM, SES PMS-306, PM, Surf Shp Imp Proj PMS-377, PM, LHA PMS-378, PM, AAW Ship PMS-383, PM, Aux & Amphib & Spec Mission Ship PMS-389, PM, DD-963 PMS-392, PM, CVN PMS-393, PM, SSN PMS-395, PM, Deep Submerg Sys PMS-396, PM, TRIDENT Submarine PMS-397, PM, V/STOL Support Shp

TABLE B-1 (Continued)

KEY ED CAPTAIN BILLETS BY ACTIVITY

<u>Activity</u>	<u>Position</u>
NAVSEASYSCOM HQ	PMS-399, PM, Guided Msl Frigate PMS-402, PM, MK-48 Torp * PMS-403, PM, AEGIS/SM-2 * PMS-403-02, Eng AEGIS PMS-404-50, PT Def Msl * PMS-405, PM, HEL PMS-406, PM, ALWT * PMS-407, PM, Captor *
NAVAL SHIPYARD	Commander
Puget Sound	Planning Off
Pearl Harbor	Production Off
Long Beach	Repair Supt
Mare Island	
Charleston	
Norfolk	
Philadelphia	
Portsmouth	
SHIPREPFAAC	CO
Yokosuka	
Guam	
SHIPREPFAAC	CO
Subic Bay	Planning Off Production Off
SUPSHIP	Supervisor
Newport News	Deputy Supervisor
Groton	
Pascagoula	
SUPSHIP	Supervisor
Bath	
Seattle	
Brooklyn	
Portsmouth	
New Orleans	
San Diego	
Long Beach	
San Francisco	
Jacksonville	

\* Refer to paragraph D.2 page B-4.

TABLE B-1 (Continued)

KEY ED CAPTAIN BILLETS BY ACTIVITY

<u>Activity</u>	<u>Position</u>
NAVELEXSYSCOM HQ	ELEX-460, Dir Maint Eng Div ELEX-05, Dep Cdr Matl Acq ELEX-03, Dep CDR R&T ELEX-103, Fld Act Planning ELEX-470, Sys Eff Engr Div ELEX-570 ADP Sys Div PME-106, PM, Space PME-107, PM, REWSON PME-108, PM, Command Cont & Comm PME-117, PM, Spec Comm PME-124, PM, Undersea Surv
NESEC Vallejo San Diego Charleston Portsmouth	CO
NAVSEEACTPAC	CO
NAVSEC	6100, HD Shp Sys Eng & Design 6110, HD Shp Sys Dsgn/Dev 6120, HD Hull Div 6140, Dir Mach Div 6170, HD Combat Sys Design & Eng Div 6172, HD Tech Data Sys Br
NAVSEC NOR DIV	OIC
NAVSEC PHILA DIV	OIC
SSPO	SP-20, Dir Tech Div SP-23, HD, F/C & Guidance BR SP-24, Navigation Br SP-26, Shp Instal & Design SP-27, Dir Missile Br SP-200, Dep Tech Dir

TABLE B-1 (Continued)

## KEY ED CAPTAIN BILLETS BY ACTIVITY

<u>Activity</u>	<u>Position</u>
NR ERDA	Dep Dir
NR ERDA PITTS	Asst Mgr
NR ERDA SCHNETY	Asst Mgr
NSWSES	Code 4000, Dir Eng
NTS KEYPORT	CO
NOS INDIAN HEAD	CO
NOS LOUISVILLE	CO
NWSC CRANE	CO
NPRO	CO
Pomona	
Sunnyvale	
POMFLANT	CO
SWFPAC	CO
ED SCHOOL	OIC
RCA MOORESTOWN	AEGIS Tech Rep
ASN (I&L)	Dir Ship Progs
CNM	PM-20, FM, ASMD *
CNM	MAT-00B, Exec Asst/Pers Aide
CNM TADSO	Director (09Y)
OPNAV	OP-941E, NAVSATCOMMPROG Coor
	OP-433D, Maint Pol Sec
	OP-82K, Asst for Ship Eng
BUPERS	PERS-445, HD ED Assign
USNA	Dir Eng/Wpns
NROTCU MIT	CO
SHIPLO SPAIN	CO
ONR	Asst CH for Research
NRL OFF NAV RES	Director
WWMCC Sys Eng Org	ELEX Eng Mgr
NCSL	CO
NELC	Commander
NUC	Commander
NUSC	Commander
NUSC NEWPORT	OIC
DTNSRDC	CO
INSURV	Hull Mbr
	Eng Mbr
SUBINSURVLANT	Sr Eng
SUBINSURVPAC	Sr Eng
TRIDENT REP FAC	Rep Off

\* Refer to paragraph D.2 page B-4.

TABLE B-1 (Continued)  
KEY ED CAPTAIN BILLETS BY ACTIVITY

<u>Activity</u>	<u>Position</u>
STF AIRLANT	Shp Matl
STF AIRPAC	Shp Matl - Ships
STF SUBLANT	Stf Matl - ACOS
STF SUBPAC	Force Matl
STF SURFLANT	ACOS Eng
STF SURFPAC	Force Eng
STF LOGPAC	Asst Maint Off
SERVRON SIX	Current Shp Maint Off
NAVSURFGRU WESTPAC	Flt Maint
STF CINCLANTFLT	Maint
	Flt Maint Asst

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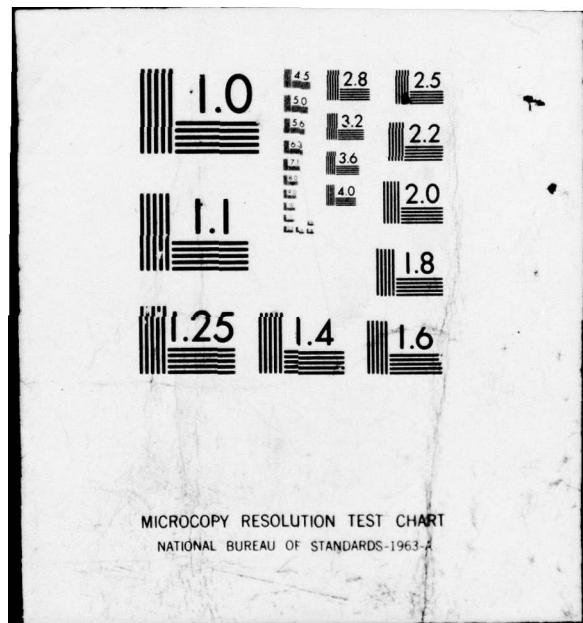


TABLE B-2

CURRENT ED CAPTAIN BILLETS RECOMMENDED FOR  
REDESIGNATION, ABOLISHMENT, OR DOWNGRADING

## A. ED Captain billets recommended for redesignation

JMMAT GOLCUK	SR ADVISOR
JNT TAC COMM OFF FT MON	DEP DIR
DTNSRDC CARDEROCK	OIC
DTNSRDC ANNAPOLIS	OIC
CMD&CONT TECH CEN	AST DEP DIR FOR SYS
DCA	PROJ MGR 46/01
CNM	HD PROJ MGMT POL BR
NAVELEXSYSCOM HQ	STF MACH MTL/HD MAINT DIV 093, AST VCMDR
NAVSEASYSCOM HQ	04, DEP CMDR FOR LOGISTICS 940, DIRCMDSUPT SYS PME-106, ASST PM SATCOMM PME-107, HD SEA NYMPH DEV BR PME-124, DIR SOSUS PROG DIV 01E, ASSOC COMPT 04H, DIR SAFETY DIV 042, DIR FMP MGT DIV 04E, EXEC DIR FLT LOG SPT 661, DIR SURF SYS SUBGRP 93B, AST DEP CMDR SHIP MAINT SEA-04D, EXEC DIR FLT MOD CO
NAVSEACENPAC	DIR SUP SVCS
NRL OFF NAV RES	ENG
COMSC LANT	ENG
COMSC PAC	AST PM, DIR WPS DIV
ASW SYS PROJ OFF	HD, LCHR & HANDLING BR
SSPO	ACNR FOR TECH
OFF NAV RES	NAVENG LOG
SPCC MECH	DEP DIR PROGS
NPS MONTEREY	CHIEF ENG
DSA WASH DC	PMS-307
PMS WASH DC FMS COMP	PMS-376
EODGRUONE	COMMANDER
EODGRUTWO	COMMANDER
EODFAC	CO

TABLE B-2 (cont'd)

- B. ED Captain billets recommended for redesignation to civilian

NAVSEASYSCOM HQ	SEA-031, DIR PLAN & PROG SEA-098, DEP CMDR R&M
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- C. ED Captain billets recommended for transfer to the U.S. Army

NAD HAWTHORNE	CO
NAD MCALISTER	CO

- D. ED Captain billets recommended to be abolished

NAVSEC	SEC-6100B
NAVSEASYSCOM HQ	SEA-06B1, DAMAGE CONTROL
OPNAV	OP-943D, HD COMM SYS
NSWSSES COMP WASH DC	SEA-06G5A, ASMS

- E. ED Captain billets recommended to be retained as ED billets but downgraded to Commander rank.

NAVSEASYSCOM HQ	SEA-037, DIR SHP SILENCING DIV SEA-991, DIR LOG SUP DIV
OPNAV	OP-37C, AST FOR SHIP DESIGN
PMS WASH DC MI COMP	PMS-395, DEPUTY
SUPSHIP STURGEON BAY	SUPVR
STF SURFLANT	FORCE MAINT
STF SURFPAC	STF MATL/FORCE ROH
NAPEC CRANE	OIC
NAVSEC	SEC-6105
STF COMSIXTH FLT	STF MATL
SUPSHIP PASCAGOULA	EAST BANK ASST
ICAF	STUDENT
PMS WASH DC PT HUE COMP	PMS-403C, AEGIS
BATH COMP	PMS-3991, DIR TECH
NNEWS COMP	PMS-392T1, TECH MGT
PASCA COMP	DIR SHIP SYS MGT DIV-PMS-377

TABLE B-3

NON-ED KEY CAPTAIN BILLETS  
RECOMMENDED FOR REDESIGNATION TO ED

<u>Activity</u>	<u>Position</u>
NTS KEYPORT	CO
CNM	PM-20, PM, ASMD *
WWMCC SYS ENG ORG	ELEX Eng Mgr
NUC	Commander
NUSC	Commander
CNM TADSO	Director (09Y)
NCSL	CO
OPNAV	OP-941E, NAVSATCOMM Prog Coord OP-433D, Maint Pol Sec SEA-034, Hd Electro Mag and Acous Div SEA-653, Dir Surf Gun Sys SEA-661C, Dir Surf Sonar Div SEA-662, Dir Torpedo Subgroup SEA-663, Dir Mines/Spec War/EOD SEA-992, Dir Ammo Mgt Div SEA-993, Dir Nuc Weps Div PMS-304, PM, SES PMS-395, PM, Deep Submerg Sys PMS-402, PM, MK-48 Torpedo*
NAVELEXSYS.COM HQ	PMS-403, PM, AEGIS/SM-2* PMS-404-50, PM, Pt Def MsI* PMS-405, PM, HEL PMS-406, PM, ALWT* PMS-407, PM, CAPTOR* PME-106, PM, Navy Space Prog PME-107, PM, REWSON PME-108, PM, Command Cont & Comm PME-124, PM, Undersea Surv ELEX-05, Dep Cdr Matl Hcq ELEX-460, Dir Maint Eng Div

\* Refer to paragraph D.2 page B-4.

APPENDIX C  
COMPUTER MODEL METHODOLOGY

A. The current ED billet structure was evaluated by computer simulation using the number of captain billets as the basis for determining the size of community structure. Given the number of captains, a direct accession community structure (the classic pyramid) can be constructed, the shape of which will depend on various factors such as promotion opportunities and attrition rates. The ED billet structure has historically been diamond shaped, depending for the most part on line transfers to provide the bulk of accessions.

B. In arriving at the size of a direct accession community as well as prescribed billet structures and inventory projections, the Study Group relied on two official and validated Navy computer models; the CNO (OP-01) Prescribed Billet Structure Model and the BUPERS Officer Management Simulation Model. The Prescribed Billet Structure Model has been used by OP-01 to restructure the Supply Corps and Civil Engineer Corps communities. The Officer Management Simulation Model is used by BUPERS for inventory projections. This model is a personnel inventory analysis tool which offers a trial and error approach in reaching a prescribed officer inventory when employing a combination of direct and lateral accessions.

C. In constructing a proper ED community, an analysis of every existing or potential ED billet should be accomplished. Time did not permit a complete analysis of community structure in terms of billets in every officer grade. Therefore, the approach was to analyze the senior ED positions and potential positions (captains and some commanders). Additionally, the potential qualifications and typical career patterns for these positions were developed, so that an estimate of the total community structure could be made.

D. The Study Group estimated the number of billets in the grade of CDR, LCDR, LT, LTJG and ENS for two prescribed structures which were used in conducting a series of inventory projections. The purpose of the projections was threefold:

1. To assess the effect of a direct accession policy,
2. To determine the projected inventories with various accession and promotion policies, and
3. To determine the combination of accession and promotion policies which maintains the prescribed structures in a steady state condition.

E. The ED billet structure utilized for the inventory projections consisted of the following officers by grade:

	<u>Community A</u> <u>(Table C-1)</u>	<u>Community B</u> <u>(Table C-2)</u>
CAPT	180	175
CDR	360	360
LCDR	517	453
LT	213	210
LTJG	64	32
ENS	32	32
TOTAL	<u>1,366</u>	<u>1,262</u>

F. Once having established tentative ED grade structures for projection purposes, the BUPERS inventory projection model was used to determine an accession plan (i.e., numbers of direct accessions and line transfers) which would result in the prescribed structure under steady state conditions. Tables C-1 and C-2 summarize the results of several of the projections. These runs varied promotion percentages, accession mixes and accession sources. An accession mix and promotion percentage was chosen which produced a solution which converged sufficiently close to the prescribed grade structure to provide confidence that a solution is achievable.

Figure C-1 illustrates the relationship between the pure direct accession community (pyramid structure) and ED community.

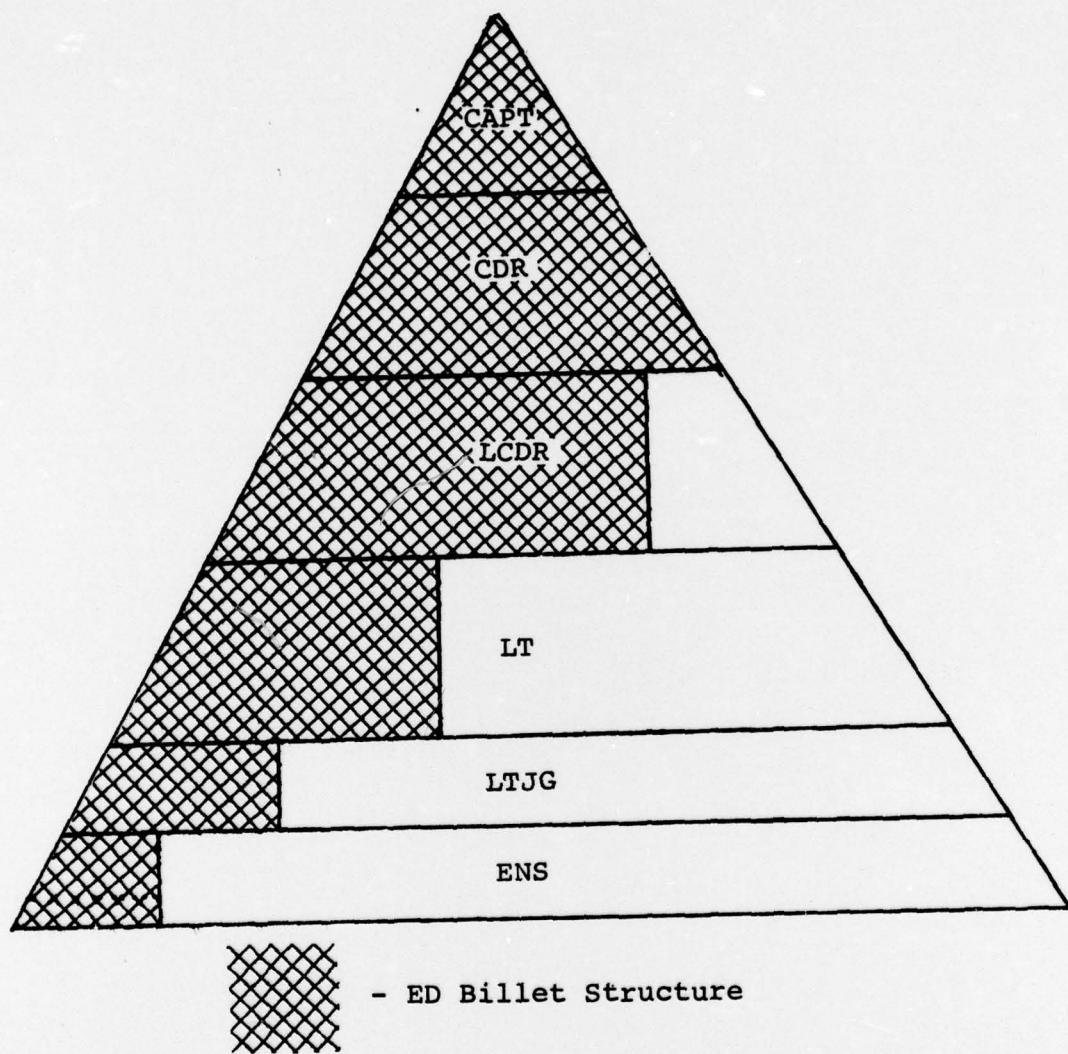


Figure C-1

PYRAMID STRUCTURE

G. The ED community needs few junior officers. Consequently the ED community has depended primarily on line transfers to meet annual accession requirements. If the ED community depended entirely on direct input rather than line transfers, the size of the community would have to be 7,725 officers. The number of officers in such a community is shown below.

Captain	180
Commander	572
Lieutenant Commander	1156
Lieutenant	1940
Lieutenant Junior Grade	1651
Ensign	2246
TOTAL	<u>7725</u>

H. An inventory projection was also made assuming no direct accessions to the ED community. This established a bound on the number of line transfers necessary to support those positions determined by the Study Group to be key ED positions. Community A, less ENS and LTJG billets, was used for this projection. Nine CDR, 75 LCDR and 42 LT line transfers would be required to achieve and maintain this community.

I. From these inventory projections using certain accession policies, certain observations can be made.

1. A community sustained by direct accession is considerably larger than one maintained by line transfers.
2. A given ED community structure, similar to the ones used in these projections, can be sustained by some combination of line transfers and direct accessions.
3. ED inventory projections are sensitive to promotion opportunities. An increased promotion opportunity over line opportunity was required to maintain a stable community.
4. ED community structure stability is sensitive to accession source and grade mix changes.

# ENGINEERING DUTY OFFICER INVENTORY PROJECTION

*(COMMUNITY A)*  
TABLE C 1

AUTHORIZED BILLETS	COMMUNITY A	INVENTORY PROJECTION		INVENTORY PROJECTION		INVENTORY PROJECTION		INVENTORY PROJECTION	
		#1	#2	#3	#4	#5	#6	#7	#8
CAPT	208	180	180	190	159	179	182	182	184
CDR	403	360	572	545	458	504	436	378	398
LCDR	471	517	1156	677	548	557	557	510	506
LT	213	213	1920	268	202	217	217	213	234
LTJG	62	64	1651	77	65	65	65	0	65
ENS	32	32	2246	32	32	32	32	0	32
<b>TOTAL</b>	<b>1389</b>	<b>1366</b>	<b>7725</b>	<b>1789</b>	<b>1464</b>	<b>1554</b>	<b>1489</b>	<b>1283</b>	<b>1419</b>

ACCESSIONS\*

C-5	(1) DIRECT	N/A	1125	16	16	16	0	0	16
	(2) LINE TRANSFER	N/A	NONE	176	144	155	143	126	129
<hr/>									
	PROMOTION OPPORTUNITY								
	CAPT-CDR-LCDR	N/A	60-70-80	60-70-80	60-70-80	60-70-80	70-70-80	80-70-80	90-70-80

\*DIRECT ACCESSIONS - 50% OCS, 50% NROTC (SCHOLARSHIP)

LINE TRANSFERS - APPROXIMATELY 1/3 EACH WITH USNA, OCS  
AND NROTC (SCHOLARSHIP) SOURCE  
- MIX OF CDR, LCDR, LT, LTJG

INVENTORY PROJECTION  
#7

INVENTORY PROJECTION  
#6

INVENTORY PROJECTION  
#5

INVENTORY PROJECTION  
#4

INVENTORY PROJECTION  
#3

INVENTORY PROJECTION  
#2

INVENTORY PROJECTION  
#1

**ENGINEERING DUTY OFFICER INVENTORY PROJECTION  
(COMMUNITY B)**  
**TABLE C-2**

AUTHORIZED BILLETS	COMMUNITY B	INVENTORY PROJECTION#1	INVENTORY PROJECTION#2	INVENTORY PROJECTION#3	INVENTORY PROJECTION#4	INVENTORY PROJECTION#5
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CAPT	208	175	192	106	123	138
CDR	403	360	370	316	309	350
LCDR	471	453	462	462	472	436
LT	213	210	203	210	210	210
LTJG	62	32	34	34	34	34
ENS	32	32	32	32	32	32
<b>TOTAL</b>	<b>1389</b>	<b>1262</b>	<b>1293</b>	<b>1160</b>	<b>1180</b>	<b>1199</b>
						<b>1221</b>

ACCESSIONS\*

(1) DIRECT	N/A	16	16	16	16
(2) LINE TRANSFER		119	104	104	104

PROMOTION OPPORTUNITY

CAPT-CDR-LCDR	N/A	85-70-80	60-70-80	70-70-80	70-80-80
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\* DIRECT ACCESSIONS - 50% OCS, 50% NROTC (SCHOLARSHIP)

LINE TRANSFERS

- APPROXIMATELY 1/3 EACH WITH  
USNA, OCS, NROTC (SCHOLARSHIP) SOURCE  
- MIX OF CDR, LCDR, LT, LTJG